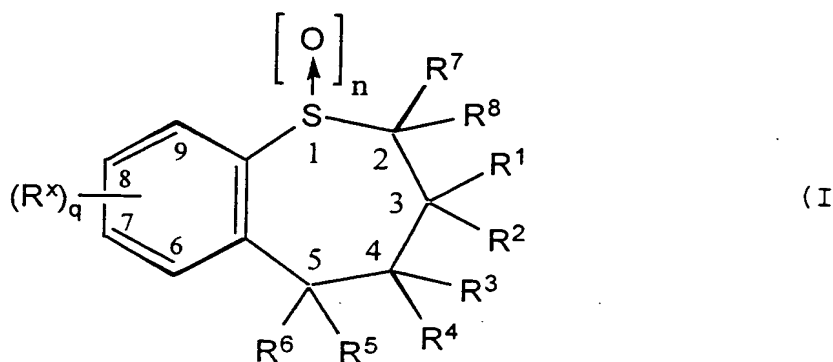


What is claimed is:

1. A compound of formula (I):



wherein:

q is an integer from 1 to 4;

n is an integer from 0 to 2;

R^1 and R^2 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl,

wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{10}R^wA^-$, SR^9 , $S^+R^9R^{10}A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

wherein alkyl, alkenyl, alkynyl, alkylaryl, alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl optionally have one or more carbons replaced by O, NR^9 ,

$N^+R^9R^{10}A^-$, S, SO, SO₂, $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^W are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, arylalkyl, and alkylammoniumalkyl; or

R^1 and R^2 taken together with the carbon to which they are attached form C₃-C₁₀ cycloalkyl;

R^3 and R^4 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, acyloxy, aryl, heterocycle, OR⁹, NR⁹R¹⁰, SR⁹, S(O)R⁹, SO₂R⁹, and SO₃R⁹, wherein R^9 and R^{10} are as defined above; or

R^3 and R^4 together form =O, =NOR¹¹, =S, =NNR¹¹R¹², =NR⁹, or =CR¹¹R¹²,

wherein R^{11} and R^{12} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl, heterocycle, carboxyalkyl, carboalkoxyalkyl, cycloalkyl, cyanoalkyl, OR⁹, NR⁹R¹⁰, SR⁹, S(O)R⁹, SO₂R⁹, SO₃R⁹, CO₂R⁹, CN, halogen, oxo, and CONR⁹R¹⁰, wherein R^9 and R^{10} are as defined above, provided that both R^3 and R^4 cannot be OH, NH₂, and SH, or

R^{11} and R^{12} together with the nitrogen or carbon atom to which they are attached form a cyclic ring;

R^5 and R^6 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, OR³⁰, SR⁹, S(O)R⁹, SO₂R⁹, and SO₃R⁹,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl,

heterocycle, quaternary heterocycle, and quaternary heteroaryl can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

wherein:

A^- is a pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation, said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo, $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8R^9A^-$, and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O, NR^7 , $N^+R^7R^8A^-$, S, SO, SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$, $P^+R^7R^8A^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, polyalkyl, aryl,

arylalkyl, cycloalkyl, heterocycle, heteroaryl,
quaternary heterocycle, quaternary heteroaryl, and
quaternary heteroarylalkyl,

5 wherein alkyl, alkenyl, alkynyl, arylalkyl,
heterocycle, and polyalkyl optionally have one or more
carbons replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S, SO, SO_2 ,
 $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, $\text{P}(\text{O})\text{R}^9$, phenylene, carbohydrate,
amino acid, peptide, or polypeptide, and

10 R^{13} , R^{14} , and R^{15} are optionally substituted with
one or more groups selected from the group consisting
of sulfoalkyl, quaternary heterocycle, quaternary
heteroaryl, OR^9 , NR^9R^{10} , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, SR^9 , $\text{S}(\text{O})\text{R}^9$,
 SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $\text{CONR}^9\text{R}^{10}$, SO_2OM ,
15 $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$, $\text{P}^+\text{R}^9\text{R}^{10}\text{R}^{11}\text{A}^-$, $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, and
 $\text{C}(\text{O})\text{OM}$,

wherein R^{16} and R^{17} are independently selected
from the substituents constituting R^9 and M; or

R^{14} and R^{15} , together with the nitrogen atom to
which they are attached, form a cyclic ring; and

20 R^{30} is selected from the group consisting of alkyl,
alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle,
ammoniumalkyl, alkylammoniumalkyl, and arylalkyl; and

R^7 and R^8 are independently selected from the
group consisting of hydrogen and alkyl; and

25 one or more R^x are independently selected from the
group consisting of H, alkyl, alkenyl, alkynyl,
polyalkyl, acyloxy, aryl, arylalkyl, halogen,
haloalkyl, cycloalkyl, heterocycle, heteroaryl,
polyether, quaternary heterocycle, quaternary
30 heteroaryl, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, SR^{13} , $\text{S}(\text{O})\text{R}^{13}$, $\text{S}(\text{O})_2\text{R}^{13}$,

5 SO_3R^{13} , $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, $\text{NR}^{13}\text{OR}^{14}$, $\text{NR}^{13}\text{NR}^{14}\text{R}^{15}$, NO_2 , CO_2R^{13} ,
 CN , OM , SO_2OM , $\text{SO}_2\text{NR}^{13}\text{R}^{14}$, $\text{NR}^{14}\text{C}(\text{O})\text{R}^{13}$, $\text{C}(\text{O})\text{NR}^{13}\text{R}^{14}$,
 $\text{NR}^{14}\text{C}(\text{O})\text{R}^{13}$, $\text{C}(\text{O})\text{OM}$, COR^{13} , OR^{18} , $\text{S}(\text{O})_n\text{NR}^{18}$, $\text{NR}^{13}\text{R}^{18}$,
 $\text{NR}^{18}\text{OR}^{14}$, $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, $\text{P}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, amino acid,
peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl,
polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl,
polyether, quaternary heterocycle, and quaternary
heteroaryl can be further substituted with OR^9 , NR^9R^{10} ,
10 $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, SR^9 , $\text{S}(\text{O})\text{R}^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 ,
 CN , halogen, $\text{CONR}^9\text{R}^{10}$, SO_2OM , $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$,
 $\text{P}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, or $\text{C}(\text{O})\text{OM}$, and

15 wherein R^{18} is selected from the group consisting
of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle,
heteroaryl, alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl,
heterocycle, heteroaryl, alkyl, quaternary heterocycle,
and quaternary heteroaryl optionally are substituted
with one or more substituents selected from the group
20 consisting of OR^9 , NR^9R^{10} , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, SR^9 , $\text{S}(\text{O})\text{R}^9$,
 SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $\text{CONR}^9\text{R}^{10}$, SO_3R^9 ,
 SO_2OM , $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$, and $\text{C}(\text{O})\text{OM}$,

wherein in R^x , one or more carbons are optionally
replaced by O, NR^{13} , $\text{N}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, S, SO, SO_2 , $\text{S}^+\text{R}^{13}\text{A}^-$,
25 PR^{13} , $\text{P}(\text{O})\text{R}^{13}$, $\text{P}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, phenylene, amino acid,
peptide, polypeptide, carbohydrate, polyether, or
polyalkyl,

wherein in said polyalkyl, phenylene, amino acid,
peptide, polypeptide, and carbohydrate, one or more

carbons are optionally replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$,
S, SO, SO_2 , $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, or $\text{P}(\text{O})\text{R}^9$;

wherein quaternary heterocycle and quaternary
heteroaryl are optionally substituted with one or more
5 groups selected from the group consisting of alkyl,
alkenyl, alkynyl, polyalkyl, polyether, aryl,
haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen,
oxo, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, SR^{13} , $\text{S}(\text{O})\text{R}^{13}$, SO_2R^{13} , SO_3R^{13} ,
 $\text{NR}^{13}\text{OR}^{14}$, $\text{NR}^{13}\text{NR}^{14}\text{R}^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM ,
10 $\text{SO}_2\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{OM}$, COR^{13} , $\text{P}(\text{O})\text{R}^{13}\text{R}^{14}$,
 $\text{P}^+\text{R}^{13}\text{R}^{14}\text{R}^{15}\text{A}^-$, $\text{P}(\text{OR}^{13})\text{OR}^{14}$, $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, and
 $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$,

provided that both R^5 and R^6 cannot be hydrogen or
SH;

15 provided that when R^5 or R^6 is phenyl, only one of
 R^1 or R^2 is H;

provided that when $q = 1$ and R^x is styryl,
anilido, or anilinocarbonyl, only one of R^5 or R^6 is
alkyl; or

20 a pharmaceutically acceptable salt, solvate, or
prodrug thereof.

2. A compound of claim 1, wherein R^5 and R^6 are
25 independently selected from the group consisting of H,
aryl, heterocycle, quaternary heterocycle, and
quaternary heteroaryl,

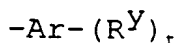
wherein said aryl, heteroaryl, quaternary
heterocycle, and quaternary heteroaryl can be
30 substituted with one or more substituent groups

independently selected from the group consisting of
alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl,
haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen,
oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} ,
5 $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM ,
 $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$,
 $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and
 $N^+R^9R^{11}R^{12}A^-$,

wherein said alkyl, alkenyl, alkynyl, polyalkyl,
10 polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can optionally have one or more carbons replaced by O,
 NR^7 , $N^+R^7R^8A^-$, S, SO, SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$,
 $P^+R^7R^8A^-$, or phenylene,

wherein said alkyl, alkenyl, alkynyl, polyalkyl,
15 polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can be further substituted with one or more substituent
groups selected from the group consisting of OR^7 ,
 NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo,
 $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl,
20 cycloalkyl, heterocycle, arylalkyl, quaternary
heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8A^-$,
and $P(O)(OR^7)OR^8$.

3. A compound of claim 2, wherein R^5 or R^6 has
25 the formula



wherein:

t is an integer from 0 to 5;

Ar is selected from the group consisting of phenyl, thiophenyl, pyridyl, piperazinyl, piperonyl, pyrrolyl, naphthyl, furanyl, anthracenyl, quinolinyl, isoquinolinyl, quinoxalinyl, imidazolyl, pyrazolyl, oxazolyl, isoxazolyl, pyrimidinyl, thiazolyl, triazolyl, isothiazolyl, indolyl, benzoimidazolyl, benzoxazolyl, benzothiazolyl, and benzoisothiazolyl; and

one or more R^Y are independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

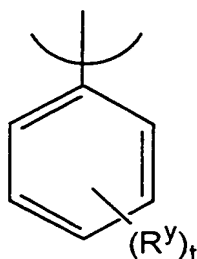
wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo, $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8A^-$, and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O, NR^7 , $N^+R^7R^8A^-$, S, SO, SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$,

$P^+R^7R^8A^-$, or phenylene.

4. A compound of claim 3, wherein R^5 or R^6 has the formula (II)

5



(II)

5. A compound of claim 4, wherein n is 1 or 2.

10

6. A compound of claim 5, wherein one of R^7 or R^8 is H and the other of R^7 or R^8 is alkyl.

7. A compound of claim 5, wherein both R^7 and R^8 are H.

15

8. A compound of claim 7, wherein R^1 and R^2 are independently selected from the group consisting of H and alkyl.

20

9. A compound of claim 8, wherein said alkyl is a C_1 - C_{10} alkyl.

10. A compound of claim 8, wherein R^1 and R^2 are both alkyl.

25

11. A compound of claim 10, wherein said alkyl is a C_1 - C_{10} alkyl.

12. A compound of claim 11, wherein said alkyl is
a C₂-C₇ alkyl.

5 13. A compound of claim 12, wherein said alkyl is
a C₂-C₄ alkyl.

10 14. A compound of claim 13, wherein said alkyl is
independently selected from the group consisting of
ethyl, n-propyl, n-butyl, and isobutyl.

15 15. A compound of claim 8, wherein R¹ and R² are
each n-butyl.

16. A compound of claim 8, wherein one of R¹ and
R² is ethyl and the other of R¹ and R² is n-butyl.

17. A compound of claim 15, wherein q is 1, 2, or
3.

18. A compound of claim 16, wherein q is 1, 2, or
3.

19. A compound of claim 17, wherein q is 1 or 2.

20. A compound of claim 19, wherein q is 1.

21. A compound of claim 18, wherein q is 1 or 2.

22. A compound of claim 21, wherein q is 1.

23. A compound of claim 19, wherein R³ and R⁴ are
independently selected from the group consisting of H

and OR⁹.

24. A compound of claim 21, wherein R³ and R⁴ are independently selected from the group consisting of H and OR⁹.

25. A compound of claim 23, wherein R⁹ is H.

26. A compound of claim 24, wherein R⁹ is H.

27. A compound of claim 25, wherein one or more R^x are in the 7-, 8-, or 9-position of the benzo ring of formula (I).

28. A compound of claim 26, wherein said R^x is in the 7-, 8-, or 9- position of the benzo ring of formula (I).

29. A compound of claim 27, wherein said R^x are in the 7- and 9- positions of the benzo ring of formula (I).

30. A compound of claim 28, wherein said R^x is in the 7-position of the benzo ring of formula (I).

31. A compound of claim 29, wherein said one or more R^x are independently selected from the group consisting of alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, alcyloxy, polyether, halogen, OR¹³, NR¹³R¹⁴, NR¹³NR¹⁴R¹⁵, N⁺R⁹R¹¹R¹²A⁻, SR¹³, S⁺R¹³R¹⁴, CO₂R¹³, NR¹⁴C(O)R¹³, and NR¹⁴C(O)R¹³,

wherein alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, and polyether, can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein in R^X , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl, and

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$.

32. A compound of claim 30, wherein said R^X is selected from the group consisting of alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, polyether, halogen, OR^{13} , $NR^{13}R^{14}$, $NR^{13}NR^{14}R^{15}$, $N^+R^9R^{11}R^{12}A^-$, SR^{13} , $S^+R^{13}R^{14}$, CO_2R^{13} , $NR^{14}C(O)R^{13}$, and $NR^{14}C(O)R^{13}$,

wherein alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, and polyether, can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein in R^X , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$,

PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl, and

5 wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO₂, $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$.

10 33. A compound of claim 31, wherein said one or more Rx are independently selected from the group consisting of polyether, OR^{13} , $NR^{13}R^{14}$, and $N^+R^9R^{11}R^{12}A^-$.

15 34. A compound of the claim 32, wherein said R^x is selected from the group consisting of polyether, OR^{13} , $NR^{13}R^{14}$, and $N^+R^9R^{11}R^{12}A^-$.

20 35. A compound of claim 33, wherein said one or more Rx are independently selected from the group consisting of OR^{13} and $NR^{13}R^{14}$.

25 36. A compound of claim 34, wherein said R^x is independently selected from the group consisting of OR^{13} and $NR^{13}R^{14}$.

37. A compound of claim 35, wherein R^{13} and R^{14} each methyl.

30 38. A compound of the claim 36, wherein R^{13} and R^{14} each methyl.

39. A compound of claim 31, wherein one or more R^Y are independently in the 3- or the 4-position of the phenyl ring of formula (II).

5

40. A compound of claim 32, wherein one or more R^Y are independently in the 3- or the 4- position of the phenyl ring of formula (II).

10

41. A compound of claim 39, wherein t is 1 or 2.

42. A compound of claim 40, wherein t is 1 or 2.

15

43. A compound of claim 41, wherein said one or more R^Y are independently selected from the group consisting of alkyl, polyether, fluoride, chloride, bromide, iodide, $NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, and OR^{13} ,

20

wherein alkyl and polyether can be further substituted with SO_3R^9 , $N^+R^9R^{11}R^{12}A^-$, and quaternary heteroaryl.

25

44. A compound of claim 42, wherein said R^Y is independently selected from the group consisting of alkyl, polyether, fluoride, chloride, bromide, iodide, $NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, and OR^{13} ,

30

wherein alkyl and polyether can be further substituted with SO_3R^9 , $N^+R^9R^{11}R^{12}A^-$, and quaternary heteroaryl.

45. A compound of claim 43, wherein said one or

more R^Y are independently selected from the group consisting of alkyl, polyether, fluoride, $NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, and OR^{13} ,

5 wherein alkyl and polyether can be further substituted with SO_3R^9 , $N^+R^9R^{11}R^{12}A^-$, and quaternary heteroaryl.

10 46. A compound of claim 44 wherein said R^Y is independently selected from the group consisting of alkyl, polyether, fluoride, $NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, and OR^{13} ,

15 wherein alkyl and polyether can be further substituted with SO_3R^9 , $N^+R^9R^{11}R^{12}A^-$, and quaternary heteroaryl.

20 47. A compound of claim 45, wherein said R^{13} and R^{14} are alkyl,

wherein alkyl can be further substituted with SO_3R^9 , $N^+R^9R^{11}R^{12}A^-$, and quaternary heteroaryl.

25 48. A compound of claim 46, wherein said R^9 and R^{10} are alkyl,

wherein alkyl can be further substituted with SO_3R^9 , $N^+R^9R^{11}R^{12}A^-$, and quaternary heteroaryl.

49. A compound of claim 47, wherein n is 2.

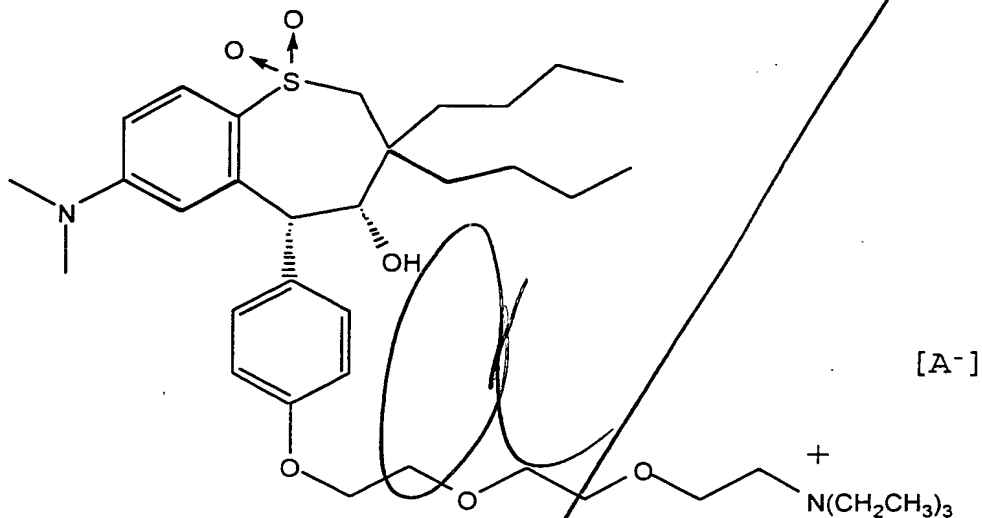
50. A compound of claim 48, wherein n is 2.

30 51. A compound of claim 49, wherein said OH group is in a syn relationship to said structure of formula (II).

52. A compound of claim 50, wherein said OH group is in a *syn* relationship to said structure of formula (II).

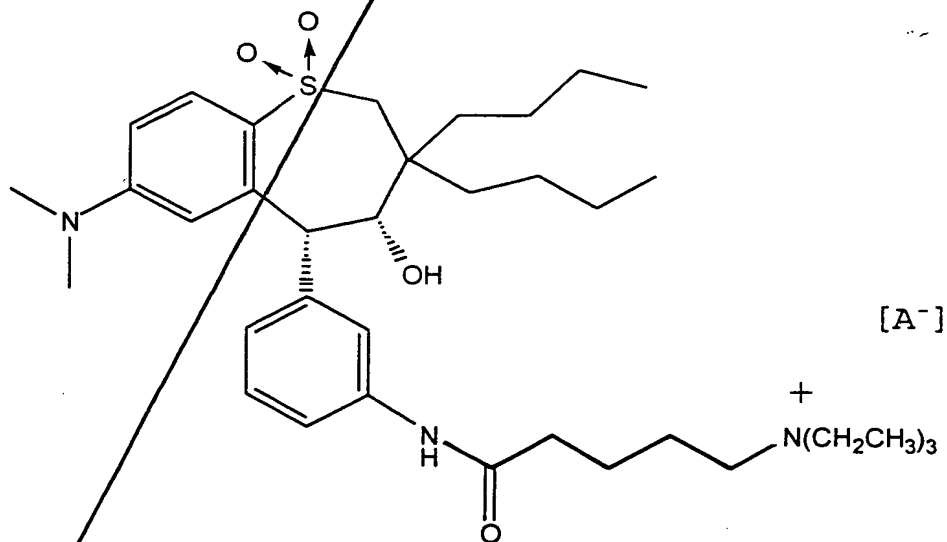
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53. A compound of claim 51, having the formula:



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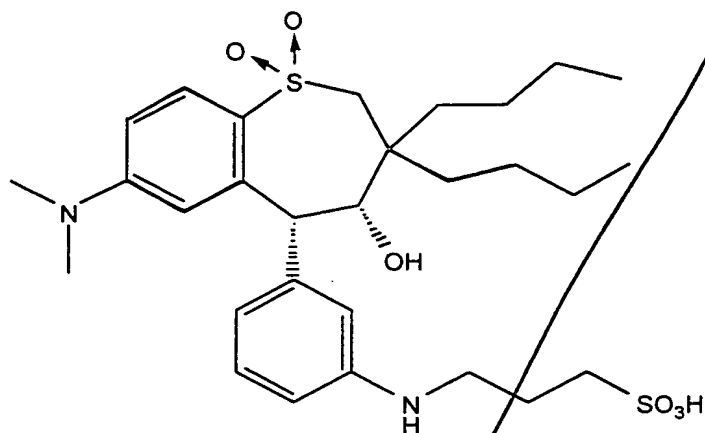
54. A compound of claim 51, having the formula:



SRL 6071
(C-3021/2)

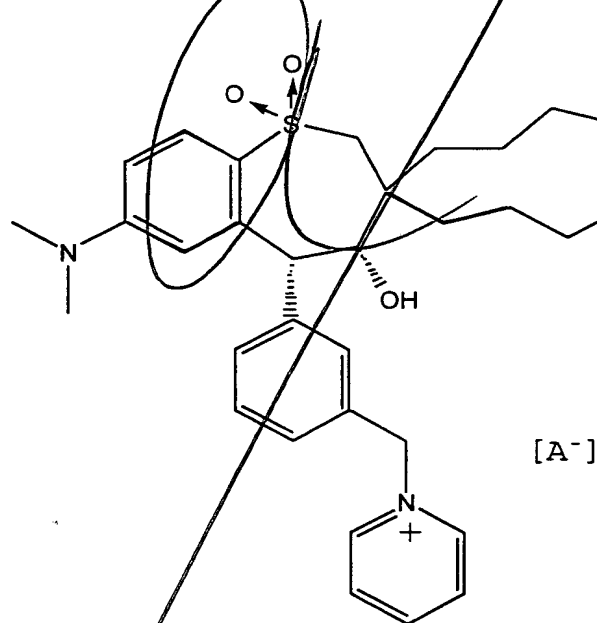
540

55. A compound of claim 51, having the formula:



5

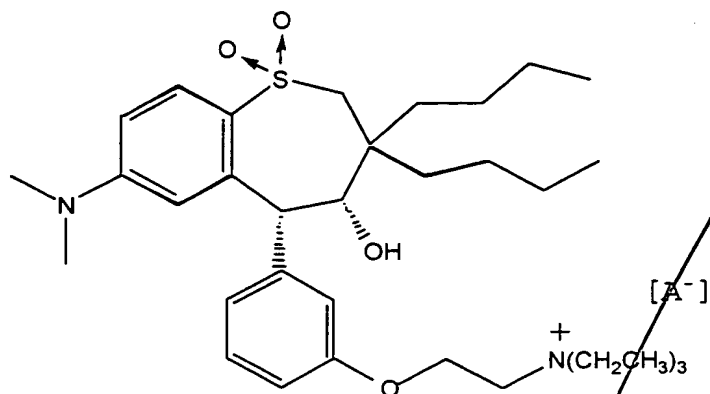
56. A compound of claim 51, having the formula:



SRL 6071
(C-3021/2)

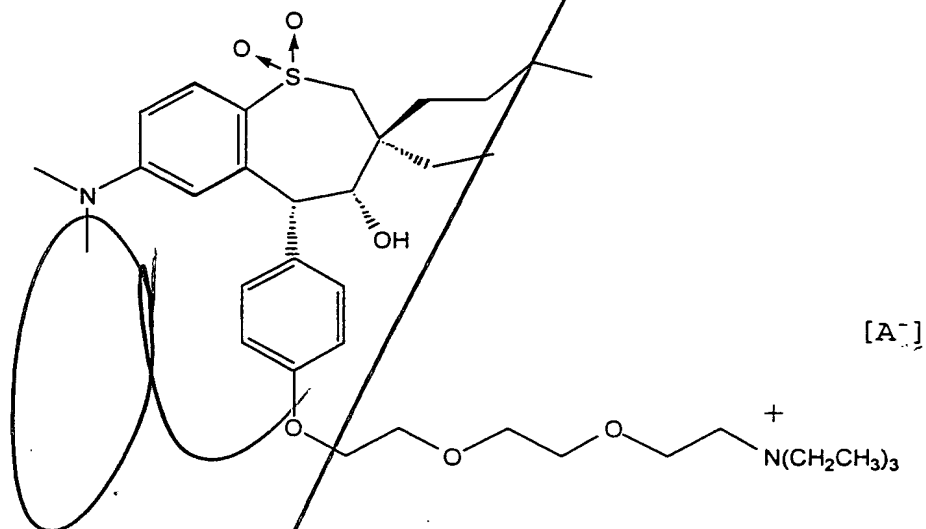
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57. A compound of claim 51, having the formula:



5

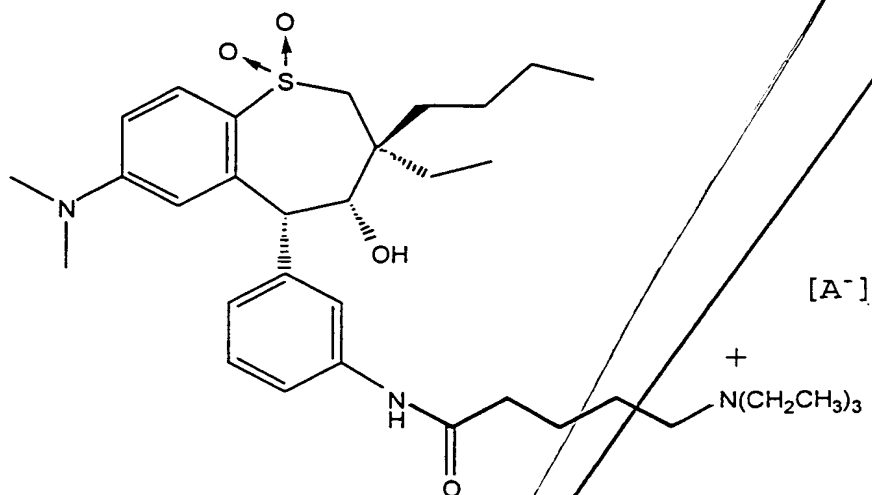
58. A compound of claim 52, having the formula:



SRL 6071
(C-3021/2)

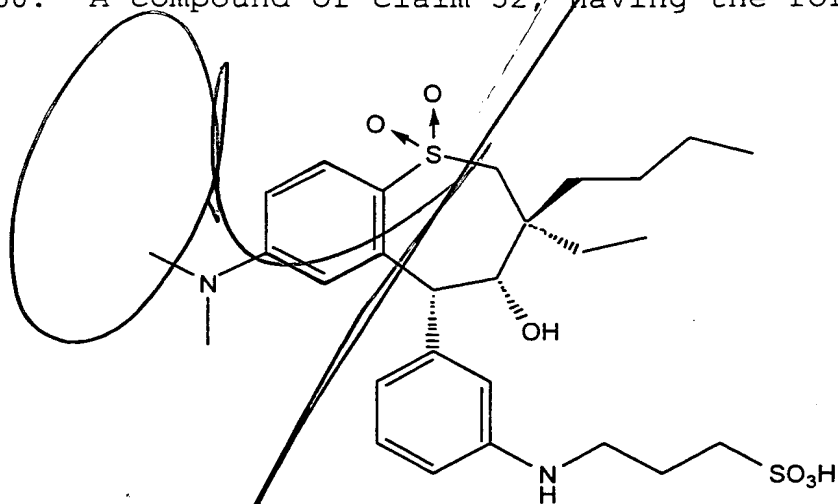
542

59. A compound of claim 52, having the formula:

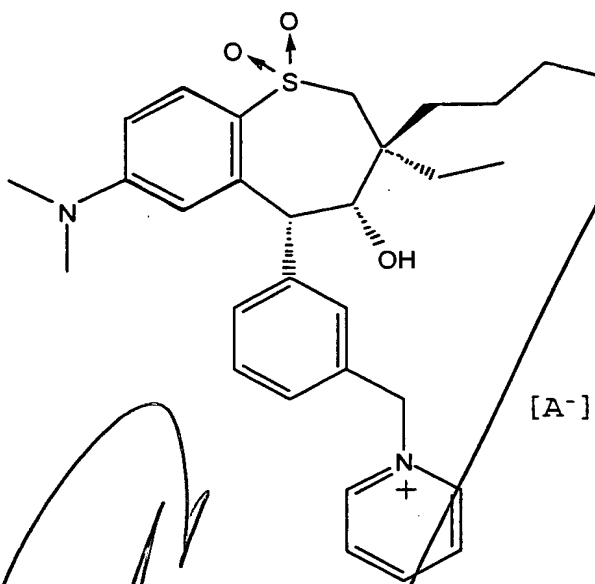


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60. A compound of claim 52, having the formula:

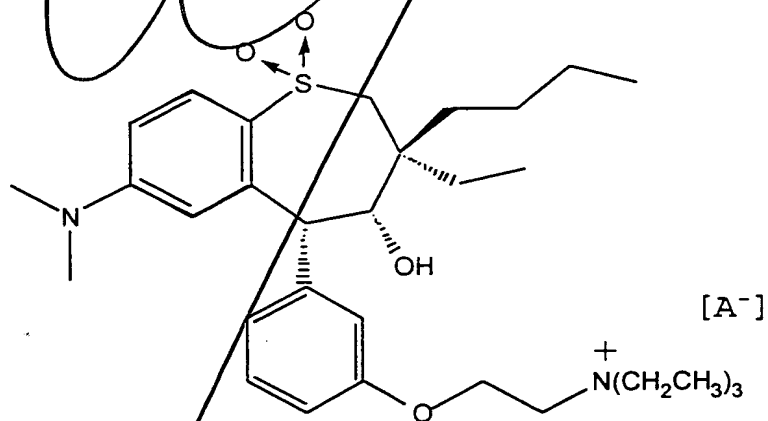


61. A compound of claim 52, having the formula:



5

62. A compound of claim 52, having the formula:

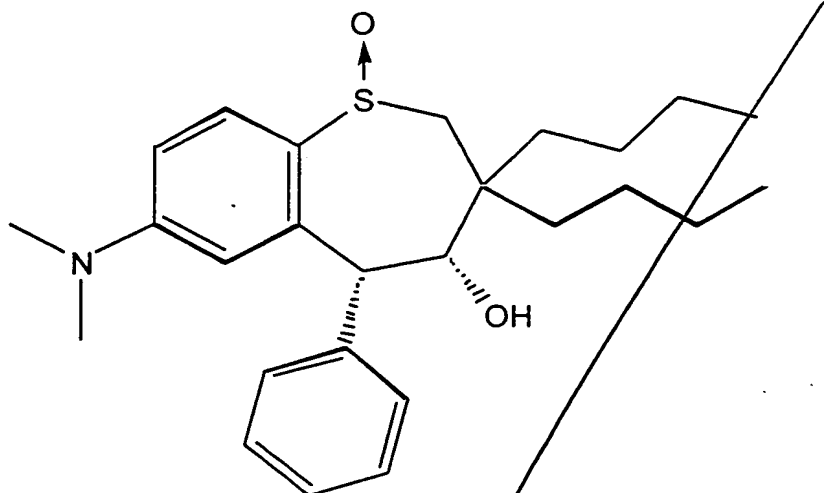


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63. A compound of claim 31, wherein n is 1.

64. A compound of claim 63, wherein R^y is H.

65. A compound of claim 64, having the formula



5 66. A compound of claim 4, wherein R¹ and R² are independently selected from the group consisting of H and alkyl.

67. A compound of claim 66, wherein said alkyl is C₁-C₁₀ alkyl.

10 68. A compound of claim 67, wherein said alkyl is C₂-C₇ alkyl.

69. A compound of claim 68, wherein said alkyl is C₂-C₄ alkyl.

15 70. A compound of claim 69, wherein R¹ and R² are independently selected from the group consisting of ethyl, n-propyl, n-butyl, and isobutyl.

20 71. A compound of claim 4, wherein R³ and R⁴ are independently selected from the group consisting of H and OR⁹.

72. A compound of claim 71, wherein R⁹ is H.

73. A compound of claim 4, wherein n is 2.

5 74. A compound of claim 3, wherein R^3 and R^4 are independently selected from the group consisting of H and OR^9 .

75. A compound of claim 74, wherein R^9 is H.

10 76. A compound of claim 3, wherein one of R^7 or R^8 is H.

15 77. A compound of claim 76, wherein both R^7 and R^8 are H.

78. A compound of claim 3, wherein said one or more R^x are independently selected from the group consisting of alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, polyether, halogen, OR^{13} , $NR^{13}R^{14}$, $NR^{13}NR^{14}R^{15}$, $N^+R^9R^{11}R^{12}A^-$, SR^{13} , $S^+R^{13}R^{14}$, CO_2R^{13} , $NR^{14}C(O)R^{13}$, and $NR^{14}C(O)R^{13}$,

20 wherein alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, and polyether, can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

25 wherein in R^x , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid,

30

peptide, polypeptide, carbohydrate, polyether, or polyalkyl, and

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more
5 carbons are optionally replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S, SO, SO_2 , $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, or $\text{P}(\text{O})\text{R}^9$.

79. A compound of claim 78, wherein said one or more R^* are independently selected from the group
10 consisting of polyether, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, and $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$.

80. A compound of claim 79, wherein said one or more R^* are independently selected from the group
15 consisting of OR^{13} and $\text{NR}^{13}\text{R}^{14}$.

81. A compound of claim 80, wherein R^{13} and R^{14} are each methyl.

82. A compound of claim 3, wherein one or more R^Y are independently in the 3- or the 4-position of the phenyl ring of formula (II).

83. A compound of claim 82, wherein one or more R^Y is selected from the group consisting of alkyl, polyether, fluoride, chloride, bromide, iodide, NR^9R^{10} , and $\text{NC}(\text{O})\text{R}^9$,

wherein alkyl and polyether can be substituted with SO_3R^9 , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, and quaternary heteroaryl.

30

84. A compound of claim 83, wherein R^9 and R^{10}

are alkyl.

85. A compound of claim 84, wherein one or more R^Y is selected from the group consisting of alkyl, polyether, fluoride, chloride, bromide, iodide, NR^9R^{10} , and $NC(O)R^9$.

86. A compound of claim 1, wherein said one or more R^X are independently selected from the group consisting of alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, polyether, halogen, OR^{13} , $NR^{13}R^{14}$, $NR^{13}NR^{14}R^{15}$, $N^+R^9R^{11}R^{12}A^-$, SR^{13} , $S^+R^{13}R^{14}$, CO_2R^{13} , $NR^{14}C(O)R^{13}$, and $NR^{14}C(O)R^{13}$,

wherein alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, and polyether, can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein in R^X , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl, and

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$.

87. A compound of claim 1, wherein n is 1 or 2.

88. A compound of claim 87, wherein n is 2.)

5 89. A compound of claim 1, wherein R^1 and R^2 are independently selected from the group consisting of H and alkyl.

10 90. A compound of claim 89, wherein said alkyl is C_1 - C_{10} alkyl.

91. A compound of claim 90, wherein said alkyl is C_2 - C_7 alkyl.

15 92. A compound of claim 91, wherein said alkyl is C_2 - C_4 alkyl.

20 93. A compound of claim 92, wherein R^1 and R^2 are independently selected from the group consisting of ethyl, n-propyl, n-butyl, and isobutyl.

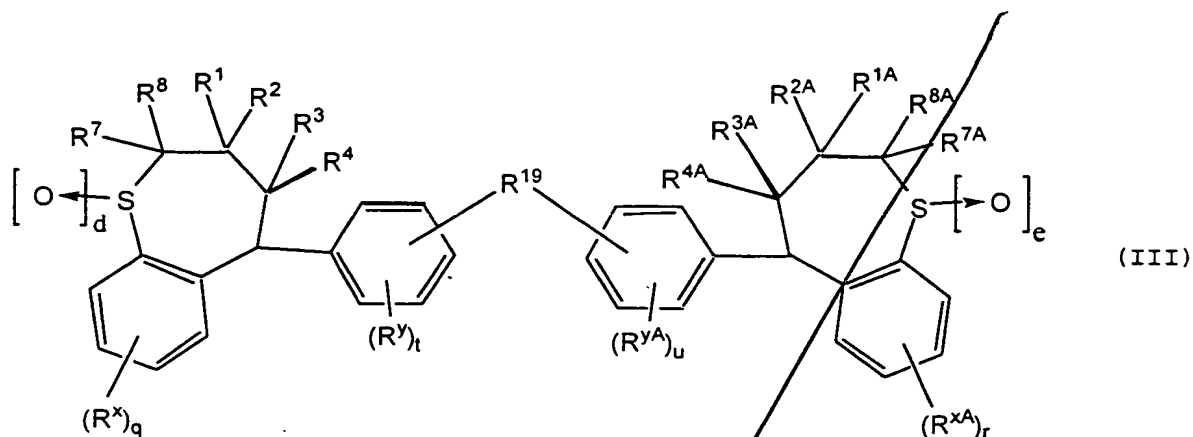
94. A compound of claim 1, wherein R^3 and R^4 are independently selected from the group consisting of H and OR^9 .

25 95. A compound of claim 94, wherein R^9 is H.

96. A compound of claim 1, wherein one of R^7 or R^8 is H.

30 97. A compound of claim 96, wherein both R^7 and R^8 are H.

98. A compound of the formula (III)



wherein :

q and r are independently integers from 0 to 4;

d and e are independently integers from 0 to 2;

t and u are independently integers from 0 to 4;

R^1 , R^{1A} , R^2 , and R^{2A} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl,

wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more substituent selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{10}R^WA^-$, SR^9 , $S^+R^9A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

wherein alkyl, alkenyl, alkynyl, alkylaryl, alkoxy, alkoxyalkyl, polyalkyl, aryl, and cycloalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^W are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, alkylammoniumalkyl, and arylalkyl; or

R^1 and R^2 taken together with the carbon to which they are attached form C_3 - C_{10} cycloalkylidene, or

R^{1A} and R^{2A} taken together with the carbon to which they are attached form C_3 - C_{10} cycloalkylidene;

5 R^3 , R^{3A} , R^4 , and R^{4A} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, acyloxy, aryl, heterocycle, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 , wherein R^9 and R^{10} are as defined above; or

10 R^3 and R^4 together form $=O$, $=NOR^{11}$, $=S$, $=NNR^{11}R^{12}$, $=NR^9$, or $=CR^{11}R^{12}$, or

R^{3A} and R^{4A} together form $=O$, $=NOR^{11}$, $=S$, $=NNR^{11}R^{12}$, $=NR^9$, or $=CR^{11}R^{12}$,

15 wherein R^{11} and R^{12} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl, heterocycle, carboxyalkyl, carboalkoxyalkyl, cycloalkyl, cyanoalkyl, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,
20 wherein R^9 and R^{10} are as defined above, provided that both R^3 and R^4 cannot be OH, NH₂, and SH, or

R^{11} and R^{12} together with the nitrogen or carbon atom to which they are attached form a cyclic ring;

25 wherein A^- is a pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation;

R^7 , R^{7A} , R^8 , and R^{8A} are independently selected from the group consisting of hydrogen and alkyl; and

30 one or more R^X and R^{XA} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen,

haloalkyl, cycloalkyl, heterocycle, heterocycle,
polyether, quaternary heterocycle, quaternary
heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$,
 SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} ,
5 CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$,
 $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$,
 $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid,
peptide, polypeptide, and carbohydrate,

10 wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl,
polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl,
polyether, quaternary heterocycle, and quaternary
heteroaryl can be further substituted with OR^9 , NR^9R^{10} ,
 $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 ,
 CN , halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$,
15 $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting
of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle,
heterocycle, alkyl,

20 wherein acyl, arylalkoxycarbonyl, arylalkyl,
heterocycle, heterocycle, alkyl quaternary heterocycle,
and quaternary heteroaryl optionally are substituted
with one or more substituent selected from the group
consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$,
 SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_3R^9 ,
25 SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

wherein in R^* and R^{xa} , one or more carbons are
optionally replaced by O , NR^{13} , $N^+R^{13}R^{14}A^-$, S , SO , SO_2 ,
 $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino
acid, peptide, polypeptide, carbohydrate, polyether, or

polyalkyl,

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$,
5 S, SO, SO_2 , $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, or $\text{P}(\text{O})\text{R}^9$;

wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl,
10 haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, SR^{13} , $\text{S}(\text{O})\text{R}^{13}$, SO_2R^{13} , SO_3R^{13} , $\text{NR}^{13}\text{OR}^{14}$, $\text{NR}^{13}\text{NR}^{14}\text{R}^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $\text{SO}_2\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{OM}$, COR^{13} , $\text{P}(\text{O})\text{R}^{13}\text{R}^{14}$, $\text{P}^+\text{R}^{13}\text{R}^{14}\text{R}^{15}\text{A}^-$, $\text{P}(\text{OR}^{13})\text{OR}^{14}$, $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, and $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$,

15 R^{19} is selected from the group consisting of alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl, polyalkoxy diyl, carbohydrate, amino acid, and peptide, polypeptide, wherein alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl, polyalkoxy diyl, carbohydrate,
20 amino acid, and peptide, polypeptide, can optionally have one or more carbon replaced by O, NR^7 , $\text{N}^+\text{R}^7\text{R}^8$, S, SO, SO_2 , $\text{S}^+\text{R}^7\text{R}^8$, PR^7 , $\text{P}^+\text{R}^7\text{R}^8$, phenylene, heterocycle, quaternary heterocycle, quaternary heteroaryl, or aryl,

25 wherein alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl, polyalkoxy diyl, carbohydrate, amino acid, peptide, and polypeptide can be substituted with one or more substituent groups independently selected from the
30 group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle,

arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$,
 SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN ,
 OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} ,
 $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and
 $N^+R^9R^{11}R^{12}A^-$;

wherein one or more R^y and R^{yA} are independently
selected from the group consisting of H, alkyl,
alkenyl, alkynyl, aryl, cycloalkyl, heterocycle,
quaternary heterocycle, OR^9 , SR^9 , $S(O)R^9$, SO_2R^9 , and
 SO_3R^9 ,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl,
and heterocycle can be substituted with one or more
substituent groups independently selected from the
group consisting of alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, heterocycle,
arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$,
 SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN ,
 OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} ,
 $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and
 $N^+R^9R^{11}R^{12}A^-$,

wherein said alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can be further substituted with one or more substituent
groups selected from the group consisting of OR^7 ,
 NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo,
 $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl,
cycloalkyl, heterocycle, arylalkyl, quaternary
heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8A^-$,
and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can optionally have one or more carbons replaced by O,
NR⁷, N⁺R⁷R⁸A-, S, SO, SO₂, S⁺R⁷A-, PR⁷, P(O)R⁷,
5 P⁺R⁷R⁸A-, or phenylene.

99. A compound of claim 98, wherein R¹, R^{1A}, R²,
and R^{2A} are independently selected from the group
consisting of H and alkyl.

100. A compound of claim 99, wherein R¹, R^{1A}, R²,
and R^{2A} are independently selected from the group
consisting of H and C₁-C₁₀ alkyl.

101. A compound of claim 100, wherein said alkyl
is a C₂-C₇ alkyl.

102. A compound of claim 101, wherein R¹, R^{1A}, R²,
and R^{2A} are independently C₂-C₄ alkyl.

103. A compound of claim 102, wherein R¹, R^{1A}, R²,
and R^{2A} are independently selected from the group
consisting of ethyl, n-propyl, n-butyl, and isobutyl.

104. A compound of claim 98, wherein R³, R^{3A}, R⁴,
and R^{4A} are independently selected from the group
consisting of H and OR⁹.

105. A compound of claim 104, wherein R⁹ is H.

106. A compound of claim 98, wherein R⁷, R^{7A}, R⁸,
and R^{8A} are H.

107. A compound of claim 98, wherein d and e are

independently 1 or 2.

108. A compound of claim 107, wherein d and e are both 2.

5

109. A compound of claim 98, wherein one or more R^X and one or more R^{xA} are independently selected from the group consisting of alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, polyether, halogen, OR^{13} , $NR^{13}R^{14}$, $NR^{13}NR^{14}R^{15}$, $N^+R^9R^{11}R^{12}A^-$, SR^{13} , $S^+R^{13}R^{14}$, CO_2R^{13} , $NR^{14}C(O)R^{13}$, and $NR^{14}C(O)R^{13}$,

10

wherein alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, and polyether, can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

15

wherein in R^X , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl, and

20

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$.

25

110. A compound of claim 98, wherein one or more R^Y and one or more R^{yA} are independently selected from the group consisting of alkyl, polyether, fluoride,

30

chloride, bromide, iodide, $\text{NR}^{13}\text{R}^{14}$, $\text{NR}^{14}\text{C}(\text{O})\text{R}^{13}$, and OR^{13} ,

wherein alkyl and polyether can be further substituted with SO_3R^9 , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, and quaternary heteroaryl.

111. A compound of claim 98, wherein R^{19} is selected from the group consisting of alkane diyl, polyalkane diyl, alkoxy diyl, and polyalkoxy diyl, wherein alkane diyl and polyalkane diyl can optionally have one or more carbon replaced by O, NR^7 , $\text{N}^+\text{R}^7\text{R}^8$, S, SO, SO_2 , $\text{S}^+\text{R}^7\text{R}^8$, PR^7 , $\text{P}^+\text{R}^7\text{R}^8$, or phenylene.

112. A compound of claim 111, wherein R^{19} is selected from the group consisting of alkoxy diyl and polyalkoxydiyl wherein one or more carbons are optionally replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}$, S, SO, SO_2 , $\text{S}^+\text{R}^9\text{R}^{10}$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}$, phenylene, amino acid, peptide, polypeptide, carbohydrate, or polyalkyl.

113. A compound of claim 112, wherein R^1 , R^{1A} , R^2 , and R^{2A} are independently selected from the group consisting of H and alkyl.

114. A compound of claim 113, wherein R^3 , R^{3A} , R^4 , and R^{4A} are independently selected from the group consisting of H and OR^9 .

115. A compound of claim 114, wherein R^9 is H.

116. A compound of claim 115, wherein R^7 , R^{7A} , R^8 , and R^{8A} are each H.

117. A compound of claim 116, wherein d and e are independently 1 or 2.

118. A compound of claim 117, wherein one or more
5 R^X and one or more R^{xA} are independently selected from the group consisting of alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, polyether, halogen, OR^{13} , $NR^{13}R^{14}$, $NR^{13}NR^{14}R^{15}$, $N^+R^9R^{11}R^{12}A^-$, SR^{13} , $S^+R^{13}R^{14}$, CO_2R^{13} , $NR^{14}C(O)R^{13}$, and $NR^{14}C(O)R^{13}$,

10 wherein alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, and polyether, can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

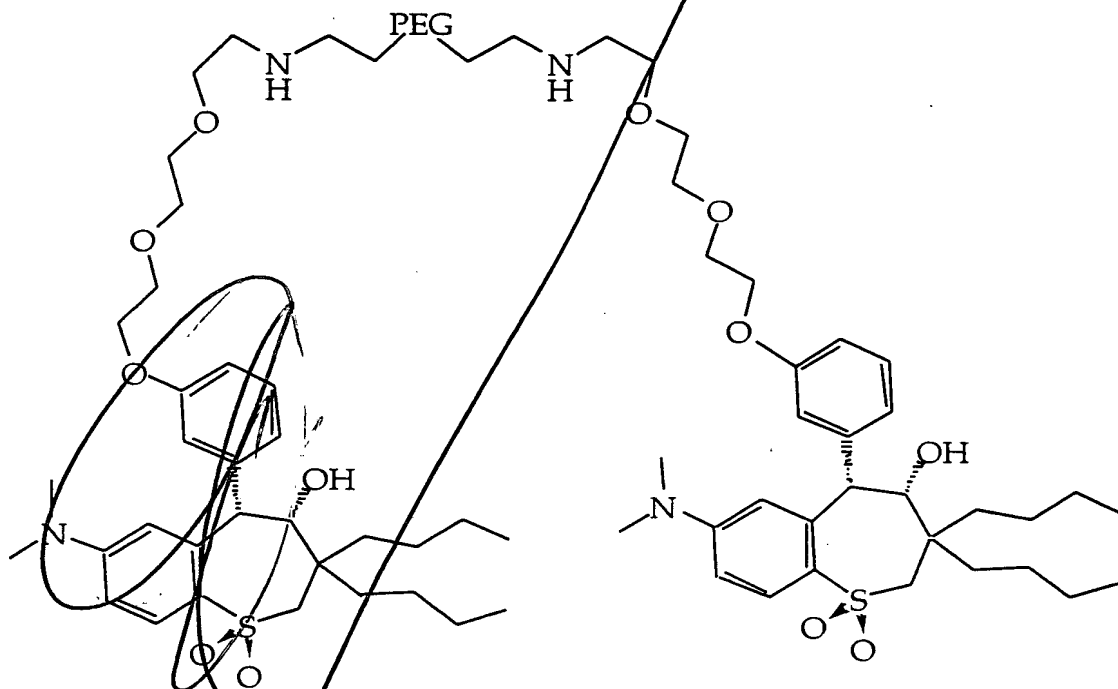
15 wherein in R^X , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or
20 polyalkyl, and

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$.

25 119. A compound of claim 118, wherein one or more R^Y and one or more R^{yA} are independently selected from the group consisting of alkyl, polyether, fluoride, chloride, bromide, iodide, $NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, and
30 OR^{13} ,

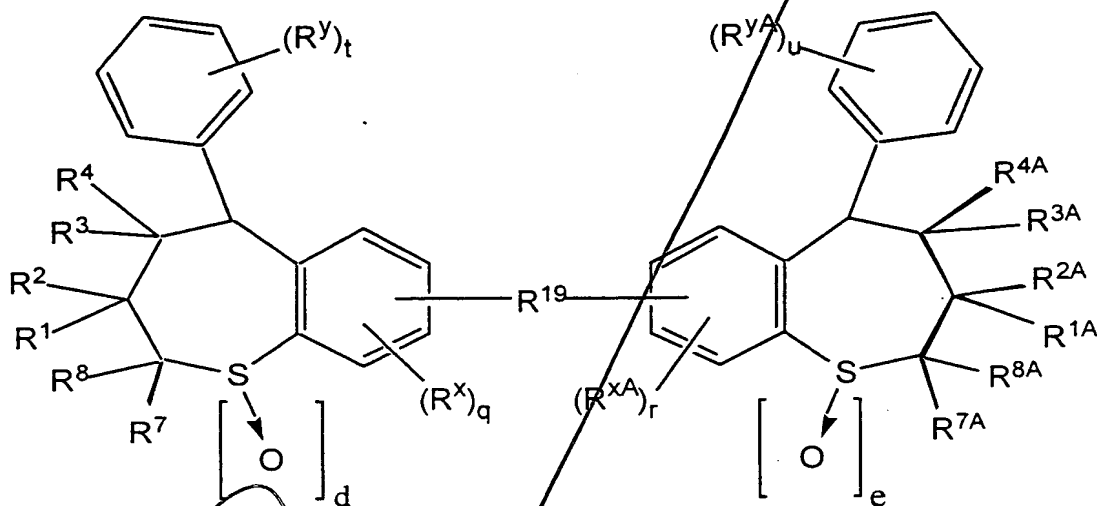
wherein alkyl and polyether can be further substituted with SO_3R^9 , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, and quaternary heteroaryl.

5 120. A compound of claim 119, having the formula:



PEG = 3400 molecular weight polyethylene glycol polymer chain

121. A compound of the formula (IV)



5 wherein :

q and r are independently integers from 0 to 3;

d and e are independently integers from 0 to 2;

t and u are independently integers from 0 to 5;

10 R^1 , R^{1A} , R^2 , and R^{2A} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl,

15 wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more substituent selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{10}R^{11}A^-$, SR^9 , $S^+R^9A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

20 wherein alkyl, alkenyl, alkynyl, alkylaryl, alkoxy, alkoxyalkyl, polyalkyl, aryl, and cycloalkyl optionally have one or more carbons replaced by O, NR^9 ,

$N^+R^9R^{10}A^-$, S, SO, SO₂, $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^W are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, alkylammoniumalkyl, and arylalkyl; or

R^1 and R^2 taken together with the carbon to which they are attached form C₃-C₁₀ cycloalkylidene, or

R^{1A} and R^{2A} taken together with the carbon to which they are attached form C₃-C₁₀ cycloalkylidene;

R^3 , R^{3A} , R^4 , and R^{4A} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, acyloxy, aryl, heterocycle, OR⁹, NR⁹R¹⁰, SR⁹, S(O)R⁹, SO₂R⁹, and SO₃R⁹, wherein R⁹ and R¹⁰ are as defined above; or

R^3 and R^4 together form =O, =NOR¹¹, =S, =NNR¹¹R¹², =NR⁹, or =CR¹¹R¹², or

R^{3A} and R^{4A} together form =O, =NOR¹¹, =S, =NNR¹¹R¹², =NR⁹, or =CR¹¹R¹²,

wherein R^{11} and R^{12} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl, heterocycle, carboxyalkyl, carboalkoxyalkyl,

cycloalkyl, cyanoalkyl, OR⁹, NR⁹R¹⁰, SR⁹, S(O)R⁹, SO₂R⁹, SO₃R⁹, CO₂R⁹, CN, halogen, oxo, and CONR⁹R¹⁰,

wherein R⁹ and R¹⁰ are as defined above, provided that both R³ and R⁴ cannot be OH, NH₂, and SH, or

R^{11} and R^{12} together with the nitrogen or carbon atom to which they are attached form a cyclic ring;

wherein A⁻ is a pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation;

R^7 , R^{7A} , R^8 , and R^{8A} are independently selected from the group consisting of hydrogen and alkyl; and

one or more R^X and R^{XA} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heterocycle, polyether, quaternary heterocycle, quaternary heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heterocycle, alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heterocycle, alkyl quaternary heterocycle, and quaternary heteroaryl optionally are substituted with one or more substituent selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_3R^9 ,

SO₂OM, SO₂NR⁹R¹⁰, PO(OR¹⁶)OR¹⁷, and C(O)OM,

wherein in R^{*} and R^{xA}, one or more carbons are optionally replaced by O, NR¹³, N⁺R¹³R¹⁴A⁻, S, SO, SO₂, S⁺R¹³A⁻, PR¹³, P(O)R¹³, P⁺R¹³R¹⁴A⁻, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl,

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR⁹, N⁺R⁹R¹⁰A⁻, S, SO, SO₂, S⁺R⁹A⁻, PR⁹, P⁺R⁹R¹⁰A⁻, or P(O)R⁹;

wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR¹³, NR¹³R¹⁴, SR¹³, S(O)R¹³, SO₂R¹³, SO₃R¹³, NR¹³OR¹⁴, NR¹³NR¹⁴R¹⁵, NO₂, CO₂R¹³, CN, OM, SO₂OM, SO₂NR¹³R¹⁴, C(O)NR¹³R¹⁴, C(O)OM, COR¹³, P(O)R¹³R¹⁴, P⁺R¹³R¹⁴R¹⁵A⁻, P(OR¹³)OR¹⁴, S⁺R¹³R¹⁴A⁻, and N⁺R⁹R¹¹R¹²A⁻.

R¹⁹ is selected from the group consisting of alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl, polyalkoxy diyl, carbohydrate, amino acid, and peptide, polypeptide, wherein alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl, polyalkoxy diyl, carbohydrate, amino acid, and peptide polypeptide, can optionally have one or more carbon replaced by O, NR⁷, N⁺R⁷R⁸, S, SO, SO₂, S⁺R⁷R⁸, PR⁷, P⁺R⁷R⁸, phenylene, heterocycle, quaternary heterocycle, quaternary heteroaryl, or aryl,

wherein alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl,

polyalkoxy diyl, carbohydrate, amino acid, peptide, and polypeptide can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$;

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo, $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8A^-$, and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O, NR^7 , $N^+R^7R^8A^-$, S, SO, SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$, $P^+R^7R^8A^-$, or phenylene.

122. A compound of claim 121, wherein R^1 , R^{1A} , R^2 , and R^{2A} are independently selected from the group consisting of H and alkyl.

123. A compound of claim 122, wherein R^1 , R^{1A} , R^2 , and R^{2A} are independently selected from the group

consisting of H and C₁-C₁₀ alkyl.

124. A compound of claim 123, wherein said alkyl is a C₂-C₇ alkyl.

5

125. A compound of claim 124, wherein R¹, R^{1A}, R², and R^{2A} are independently C₂-C₄ alkyl.

10

126. A compound of claim 125, wherein R¹, R^{1A}, R², and R^{2A} are independently selected from the group consisting of ethyl, n-propyl, n-butyl, and isobutyl.

15

127. A compound of claim 125, wherein R³, R^{3A}, R⁴, and R^{4A} are independently selected from the group consisting of H and OR⁹.

128. A compound of claim 127, wherein R⁹ is H.

20

129. A compound of claim 121, wherein R⁷, R^{7A}, R⁸, and R^{8A} are H.

130. A compound of claim 121, wherein d and e are independently 1 or 2.

25

131. A compound of claim 130, wherein d and e are both 2.

30

132. A compound of claim 121, wherein one or more R^x and one or more R^{xA} are independently selected from the group consisting of alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, polyether, halogen, OR¹³, NR¹³R¹⁴, NR¹³NR¹⁴R¹⁵, N⁺R⁹R¹¹R¹²A⁻, SR¹³, S⁺R¹³R¹⁴, CO₂R¹³, NR¹⁴C(O)R¹³, and NR¹⁴C(O)R¹³, wherein alkyl, aryl, cycloalkyl, heterocycle,

polyalkyl, acyloxy, and polyether, can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein in R^X , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl, and

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$.

133. A compound of claim 121, wherein one or more R^Y and one or more R^{YA} are independently selected from the group consisting of alkyl, polyether, fluoride, chloride, bromide, iodide, $NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, and OR^{13} ,

wherein alkyl and polyether can be further substituted with SO_3R^9 , $N^+R^9R^{11}R^{12}A^-$, and quaternary heteroaryl.

134. A compound of claim 121, wherein R^{19} is selected from the group consisting of alkane diyl, polyalkane diyl, alkoxy diyl, and polyalkoxy diyl, wherein alkane diyl and polyalkane diyl can optionally have one or more carbon replaced by O, NR^7 , $N^+R^7R^8$, S, SO, SO_2 , $S^+R^7R^8$, PR^7 , $P^+R^7R^8$, or phenylene.

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135. A compound of claim 134, wherein R^{19} is selected from the group consisting of alkoxy diyl and polyalkoxydiyl wherein one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}$, S, SO, SO₂, $S^+R^9R^{10}$, PR^9 , $P^+R^9R^{10}$, phenylene, amino acid, peptide, polypeptide, carbohydrate, or polyalkyl.

136. A compound of claim 135, wherein R^1 , R^{1A} , R^2 , and R^{2A} are independently selected from the group consisting of H and alkyl.

137. A compound of claim 136, wherein R^3 , R^{3A} , R^4 , and R^{4A} are independently selected from the group consisting of H and OR^9 .

138. A compound of claim 137, wherein R^9 is H.

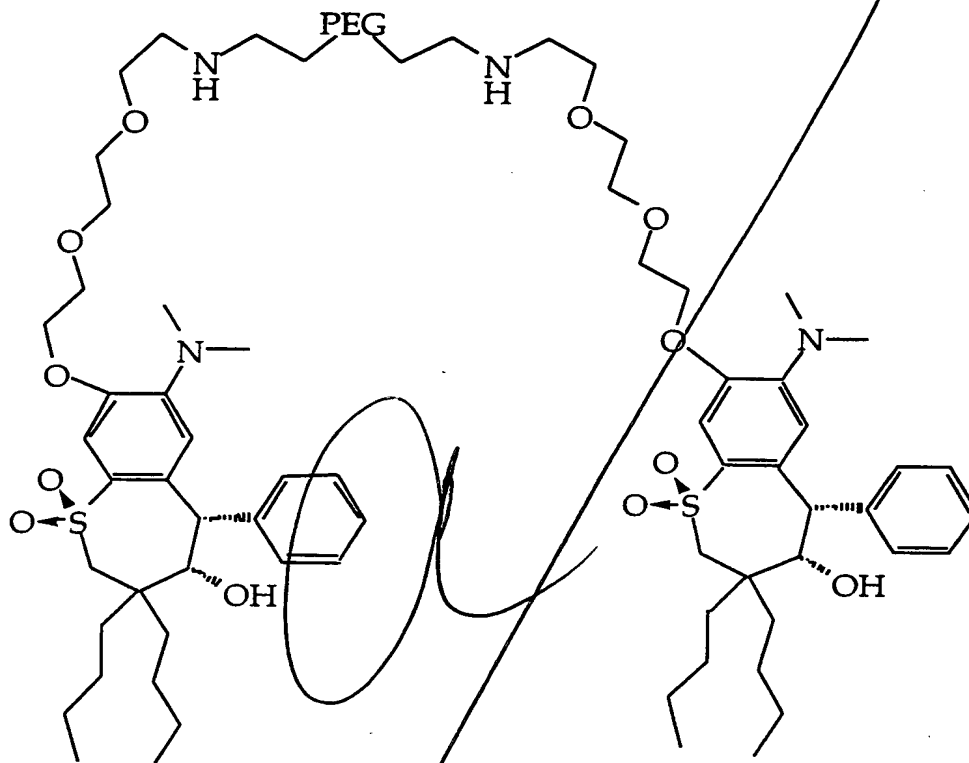
139. A compound of claim 138, wherein R^7 , R^{7A} , R^8 , and R^{8A} are each H.

140. A compound of claim 139, wherein d and e are independently 1 or 2.

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141. A compound of claim 140, having the formula:



PEG = 3400 molecular weight polyethylene glycol polymer chain

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142. A compound of formula (V)

$N^+R^9R^{10}A^-$, S, SO, SO₂, $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^w are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, alkylammoniumalkyl, and arylalkyl; or

R^1 and R^2 taken together with the carbon to which they are attached form C₃-C₁₀ cycloalkylidene, or

R^{1A} and R^{2A} taken together with the carbon to which they are attached form C₃-C₁₀ cycloalkylidene;

R^3 , R^{3A} , R^4 , and R^{4A} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, acyloxy, aryl, heterocycle, OR⁹, NR⁹R¹⁰, SR⁹, S(O)R⁹, SO₂R⁹, and SO₃R⁹, wherein R^9 and R^{10} are as defined above; or

R^3 and R^4 together form =O, =NOR¹¹, =S, =NNR¹¹R¹², =NR⁹, or =CR¹¹R¹², or

R^{3A} and R^{4A} together form =O, =NOR¹¹, =S, =NNR¹¹R¹², =NR⁹, or =CR¹¹R¹²,

wherein R^{11} and R^{12} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl, heterocycle, carboxyalkyl, carboalkoxyalkyl, cycloalkyl, cyanoalkyl, OR⁹, NR⁹R¹⁰, SR⁹, S(O)R⁹, SO₂R⁹, SO₃R⁹, CO₂R⁹, CN, halogen, oxo, and CONR⁹R¹⁰,

wherein R^9 and R^{10} are as defined above, provided that both R^3 and R^4 cannot be OH, NH₂, and SH, or

R^{11} and R^{12} together with the nitrogen or carbon atom to which they are attached form a cyclic ring;

wherein A^- is a pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation;

R^7 , R^{7A} , R^8 , and R^{8A} are independently selected from the group consisting of hydrogen and alkyl; and

one or more R^X and R^{XA} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heterocycle, polyether, quaternary heterocycle, quaternary heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heterocycle, alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heterocycle, alkyl quaternary heterocycle, and quaternary heteroaryl optionally are substituted with one or more substituent selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_3R^9 ,

SO₂OM, SO₂NR⁹R¹⁰, PO(OR¹⁶)OR¹⁷, and C(O)OM,

wherein in R^x and R^{xa}, one or more carbons are optionally replaced by O, NR¹³, N⁺R¹³R¹⁴A⁻, S, SO, SO₂, S⁺R¹³A⁻, PR¹³, P(O)R¹³, P⁺R¹³R¹⁴A⁻, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl,

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR⁹, N⁺R⁹R¹⁰A⁻, S, SO, SO₂, S⁺R⁹A⁻, PR⁹, P⁺R⁹R¹⁰A⁻, or P(O)R⁹;

wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR¹³, NR¹³R¹⁴, SR¹³, S(O)R¹³, SO₂R¹³, SO₃R¹³, NR¹³OR¹⁴, NR¹³NR¹⁴R¹⁵, NO₂, CO₂R¹³, CN, OM, SO₂OM, SO₂NR¹³R¹⁴, C(O)NR¹³R¹⁴, C(O)OM, COR¹³, P(O)R¹³R¹⁴, P⁺R¹³R¹⁴R¹⁵A⁻, P(OR¹³)OR¹⁴, S⁺R¹³R¹⁴A⁻, and N⁺R⁹R¹¹R¹²A⁻,

R¹⁹ is selected from the group consisting of alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl, polyalkoxy diyl, carbohydrate, amino acid, and peptide, polypeptide, wherein alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl, polyalkoxy diyl, carbohydrate, amino acid, and peptide polypeptide, can optionally have one or more carbon replaced by O, NR⁷, N⁺R⁷R⁸, S, SO, SO₂, S⁺R⁷R⁸, PR⁷, P⁺R⁷R⁸, phenylene, heterocycle, quaternary heterocycle, quaternary heteroaryl, or aryl,

wherein alkane diyl, alkene diyl, alkyne diyl, polyalkane diyl, alkoxy diyl, polyether diyl,

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polyalkoxy diyl, carbohydrate, amino acid, peptide, and polypeptide can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$;

wherein one or more R^y and R^{yA} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, OR^9 , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 ,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl, and heterocycle can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo,

CONR⁷R⁸, N⁺R⁷R⁸R⁹A⁻, alkyl, alkenyl, alkynyl, aryl,
cycloalkyl, heterocycle, arylalkyl, quaternary
heterocycle, quaternary heteroaryl, P(O)R⁷R⁸, P⁺R⁷R⁸A⁻,
and P(O)(OR⁷)OR⁸, and

5 wherein said alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can optionally have one or more carbons replaced by O,
NR⁷, N⁺R⁷R⁸A⁻, S, SO, SO₂, S⁺R⁷A⁻, PR⁷, P(O)R⁷,
P⁺R⁷R⁸A⁻, or phenylene.

10

143. A compound of claim 142, wherein R¹, R^{1A}, R²,
and R^{2A} are independently selected from the group
consisting of H and alkyl.

15

144. A compound of claim 143, wherein R¹, R^{1A}, R²,
and R^{2A} are independently selected from the group
consisting of H and C₁-C₁₀ alkyl.

20

145. A compound of claim 144, wherein said alkyl
is a C₂-C₇ alkyl.

146. A compound of claim 145, wherein R¹, R^{1A}, R²,
and R^{2A} are independently C₂-C₄ alkyl.

25

147. A compound of claim 146, wherein R¹, R^{1A}, R²,
and R^{2A} are independently selected from the group
consisting of ethyl, n-propyl, n-butyl, and isobutyl.

30

148. A compound of claim 142, wherein R³, R^{3A}, R⁴,
and R^{4A} are independently selected from the group
consisting of H and OR⁹.

149. A compound of claim 148, wherein R⁹ is H.

150. A compound of claim 142, wherein R^7 , R^{7A} , R^8 , and R^{8A} are H.

5 151. A compound of claim 142, wherein d and e are independently 1 or 2.

152. A compound of claim 151, wherein d and e are both 2.

10 153. A compound of claim 142, wherein one or more R^X and one or more R^{xA} are independently selected from the group consisting of alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, polyether, halogen, OR^{13} , $NR^{13}R^{14}$, $NR^{13}NR^{14}R^{15}$, $N^+R^9R^{11}R^{12}A^-$, SR^{13} , $S^+R^{13}R^{14}$, CO_2R^{13} , $NR^{14}C(O)R^{13}$, and $NR^{14}C(O)R^{13}$,

15 wherein alkyl, aryl, cycloalkyl, heterocycle, polyalkyl, acyloxy, and polyether, can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

20 wherein in R^X , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, 25 peptide, polypeptide, carbohydrate, polyether, or polyalkyl, and

30 wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$.

154. A compound of claim 142, wherein one or more R^Y and one or more R^{YA} are independently selected from the group consisting of alkyl, polyether, fluoride, chloride, bromide, iodide, $NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, and OR^{13} ,

wherein alkyl and polyether can be further substituted with SO_3R^9 , $N^+R^9R^{11}R^{12}A^-$, and quaternary heteroaryl.

155. A compound of claim 142, wherein R^{19} is selected from the group consisting of alkane diyl, polyalkane diyl, alkoxy diyl, and polyalkoxy diyl, wherein alkane diyl and polyalkane diyl can optionally have one or more carbon replaced by O, NR^7 , $N^+R^7R^8$, S, SO, SO_2 , $S^+R^7R^8$, PR^7 , $P^+R^7R^8$, or phenylene.

156. A compound of claim 155, wherein R^{19} is selected from the group consisting of alkoxy diyl and polyalkoxydiyl wherein one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}$, S, SO, SO_2 , $S^+R^9R^{10}$, PR^9 , $P^+R^9R^{10}$, phenylene, amino acid, peptide, polypeptide, carbohydrate, or polyalkyl.

157. A compound of claim 156, wherein R^1 , R^{1A} , R^2 , and R^{2A} are independently selected from the group consisting of H and alkyl.

158. A compound of claim 157, wherein R^3 , R^{3A} , R^4 , and R^{4A} are independently selected from the group consisting of H and OR^9 .

159. A compound of claim 158, wherein R^9 is H.

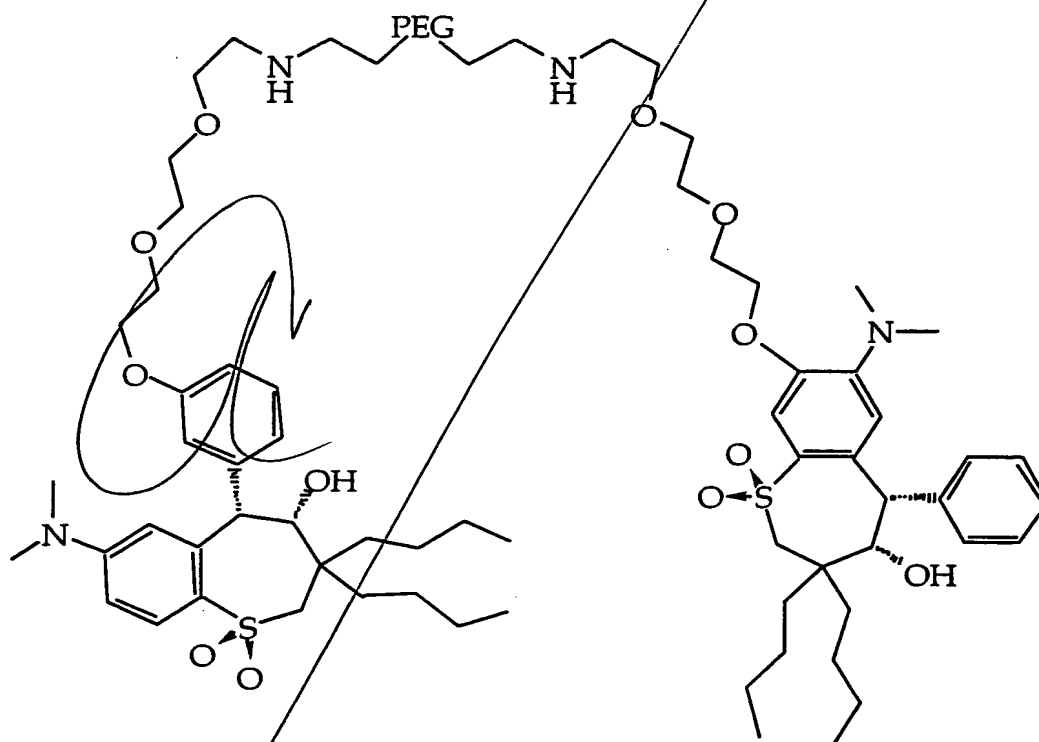
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160. A compound of claim 159, wherein R^7 , R^{7A} , R^8 , and R^{8A} are each H.

5 161. A compound of claim 160, wherein d and e are independently 1 or 2.

162. A compound of claim 161, having the formula:



PEG = 3400 molecular weight polyethylene glycol polymer chain

10 163. A pharmaceutical composition comprising an anti-hyperlipidemic condition effective amount of a compound of formula (I) of claim 1, and a pharmaceutically acceptable carrier.

15 164. A pharmaceutical composition comprising an anti-atherosclerotic effective amount of a compound of

a pharmaceutically acceptable cation,

said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent

5 groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN, oxo,

$CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary

heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8R^9A^-$, and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O,

15 NR^7 , $N^+R^7R^8A^-$, S, SO, SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$, $P^+R^7R^8A^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, polyalkyl, aryl, arylalkyl, cycloalkyl, heterocycle, heteroaryl, quaternary heterocycle, quaternary heteroaryl, and

20 quaternary heteroarylalkyl, wherein alkyl, alkenyl, alkynyl, arylalkyl, heterocycle, and polyalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, $P(O)R^9$, phenylene, carbohydrate, amino acid, peptide, or polypeptide, and

25 R^{13} , R^{14} , and R^{15} are optionally substituted with one or more groups selected from the group consisting of sulfoalkyl, quaternary heterocycle, quaternary heteroaryl, OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM ,

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$\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$, $\text{P}^+\text{R}^9\text{R}^{10}\text{R}^{11}\text{A}^-$, $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, and $\text{C}(\text{O})\text{OM}$,

wherein R^{16} and R^{17} are independently selected from the substituents constituting R^9 and M ; or

R^{14} and R^{15} , together with the nitrogen atom to which they are attached, form a cyclic ring; and

R^6 is hydroxy; and

R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl; and

one or more R^x are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heteroaryl, polyether, quaternary heterocycle, quaternary

heteroaryl, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, SR^{13} , $\text{S}(\text{O})\text{R}^{13}$, $\text{S}(\text{O})_2\text{R}^{13}$, SO_3R^{13} , $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, $\text{NR}^{13}\text{OR}^{14}$, $\text{NR}^{13}\text{NR}^{14}\text{R}^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $\text{SO}_2\text{NR}^{13}\text{R}^{14}$, $\text{NR}^{14}\text{C}(\text{O})\text{R}^{13}$, $\text{C}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{NR}^{14}\text{C}(\text{O})\text{R}^{13}$, $\text{C}(\text{O})\text{OM}$, COR^{13} , OR^{18} , $\text{S}(\text{O})_n\text{NR}^{18}$, $\text{NR}^{13}\text{R}^{18}$, $\text{NR}^{18}\text{OR}^{14}$, $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, $\text{P}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, amino acid, peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary

heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, SR^9 , $\text{S}(\text{O})\text{R}^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $\text{CONR}^9\text{R}^{10}$, SO_2OM , $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$, $\text{P}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, or $\text{C}(\text{O})\text{OM}$, and

wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle,

heteroaryl, alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl, quaternary heterocycle, and quaternary heteroaryl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_3R^9 , SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

wherein in R^X , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl,

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$;

wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

provided that both R^5 and R^6 cannot be hydrogen, OH, or SH;

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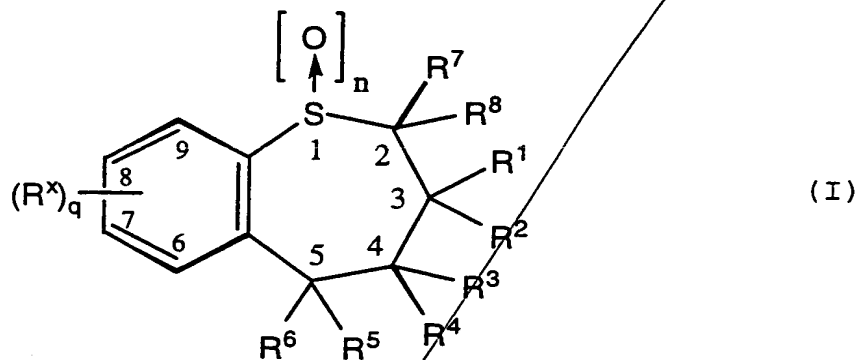
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provided that when R^5 is phenyl, only one of R^1 or R^2 is H; or

a pharmaceutically acceptable salt, solvate, or prodrug thereof.

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170. A compound of formula I:



wherein:

q is 1 or 2;

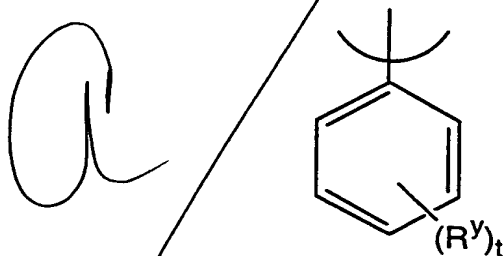
n is 2;

R^1 and R^2 are each alkyl;

R^3 is hydroxy;

R^4 and R^6 are hydrogen;

R^5 has the formula (II)



(II)

wherein t is an integer from 0 to 5;

one or more R^y are OR^{13} ;

R^{13} is selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, polyalkyl, aryl, arylalkyl, cycloalkyl, heterocycle, heteroaryl,

20

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quaternary heterocycle, quaternary heteroaryl, and
quaternary heteroarylalkyl;

5 said R^{13} alkyl, alkenyl, alkynyl, arylalkyl,
heterocycle, and polyalkyl groups optionally have one
or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO , SO_2 ,
5 $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, $P(O)R^9$, phenylene, carbohydrate,
amino acid, peptide, or polypeptide;

10 R^{13} is optionally substituted with one or more
groups selected from the group consisting of
sulfoalkyl, quaternary heterocycle, quaternary
heteroaryl, OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 ,
 SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$,
 $PO(OR^{16})OR^{17}$, $P^+R^9R^{10}R^{11}A^-$, $S^+R^9R^{10}A^-$, and $C(O)OM$,

15 wherein A^- is a pharmaceutically acceptable anion,
and M is a pharmaceutically acceptable cation,

R^9 and R^{10} are independently selected from the
group consisting of H, alkyl, alkenyl, alkynyl,
cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl,
arylalkyl, and alkylammoniumalkyl;

20 R^{11} and R^{12} are independently selected from the
group consisting of H, alkyl, alkenyl, alkynyl, aryl,
arylalkyl, alkenylalkyl, alkynylalkyl, heterocycle,
carboxyalkyl, carboalkoxyalkyl, cycloalkyl, cyanoalkyl,
25 OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen,
oxo, and $CONR^9R^{10}$, wherein R^9 and R^{10} are as defined
above, provided that both R^3 and R^4 cannot be OH, NH_2 ,
and SH; or

R^{11} and R^{12} together with the nitrogen or carbon
atom to which they are attached form a cyclic ring; and

30 R^{16} and R^{17} are independently selected from the
substituents constituting R^9 and M;

R^7 and R^8 are hydrogen; and

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one or more R^* are independently selected from the group consisting of alkoxy, alkylamino and dialkylamino; or

5 a pharmaceutically acceptable salt, solvate, or prodrug thereof.

171. A compound of claim 170 wherein R^1 and R^2 are each n-butyl.

10 172. A compound of claim 171 wherein t is 1, R^y is OR^{13} , and R^{13} is as defined in claim 170.

15 173. A compound of claim 172 wherein one or more R^* are independently selected from methoxy and dimethylamino.

174. A compound of claim 172 wherein R^* is dimethylamino.

20 175. A compound of claim 172 wherein:
t is 1;
 R^y is para- OR^{13} ; and
 R^{13} is as defined in claim 170.

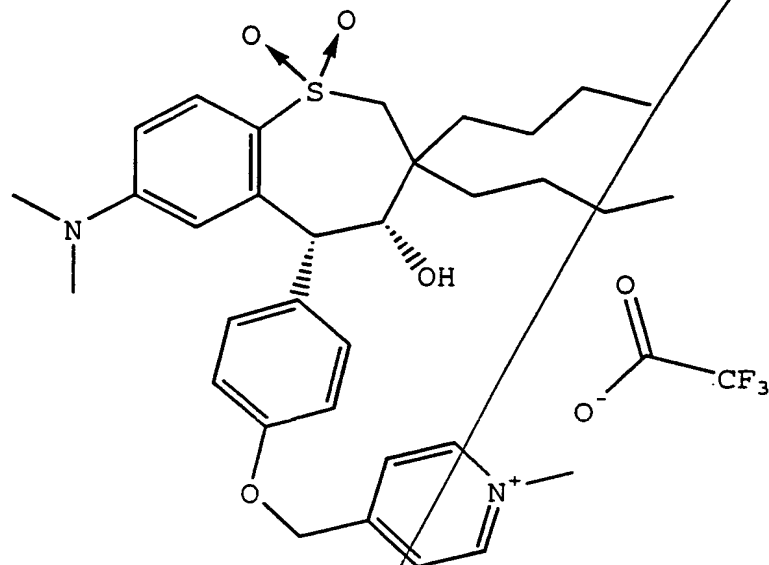
25 176. A compound of claim 172 wherein:
t is 1;
 R^y is meta- OR^{13} ; and
 R^{13} is as defined in claim 170.

30 177. A compound of claim 172 having the 4R,5R configuration.

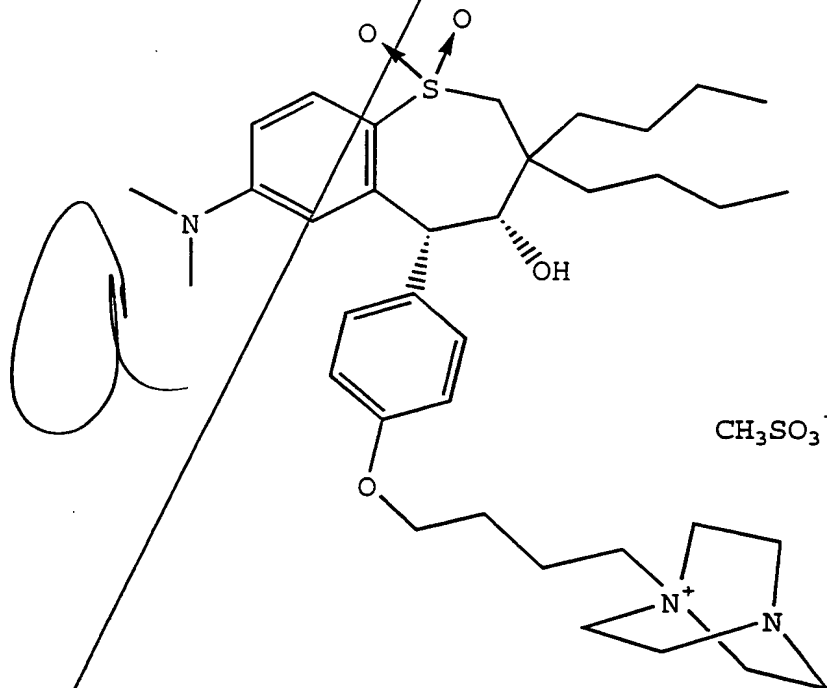
178. A compound of claim 170 having the structural formula:

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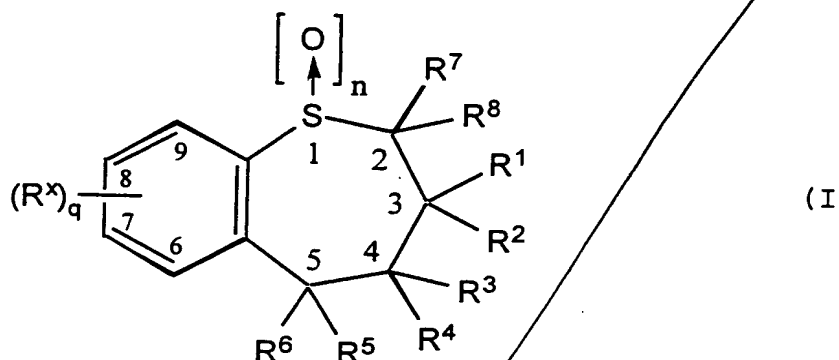
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5 179. A compound of claim 170 having the structural formula:



180. A compound of formula (I):



wherein:

q is an integer from 1 to 4;

n is an integer from 0 to 2;

R^1 and R^2 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl,

wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{10}R^wA^-$, SR^9 , $S^+R^9R^{10}A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

wherein alkyl, alkenyl, alkynyl, alkylaryl, alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^w are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle,

ammoniumalkyl, arylalkyl, carboxyalkyl,
carboxyheteroaryl, carboxyheterocycle,
carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl,
heterocyclylalkyl, and alkylammoniumalkyl; or

5 R^1 and R^2 taken together with the carbon to which
they are attached form C_3 - C_{10} cycloalkyl;

R^3 and R^4 are independently selected from the
group consisting of H, alkyl, alkenyl, alkynyl,
acyloxy, aryl, heterocycle, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$,
10 SO_2R^9 , and SO_3R^9 , wherein R^9 and R^{10} are as defined
above; or

R^3 and R^4 together form $=O$, $=NOR^{11}$, $=S$, $=NNR^{11}R^{12}$,
 $=NR^9$, or $=CR^{11}R^{12}$,

wherein R^{11} and R^{12} are independently selected
15 from the group consisting of H, alkyl, alkenyl,
alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl,
heterocycle, carboxyalkyl, carboalkoxyalkyl,
cycloalkyl, cyanoalkyl, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$,
 SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,
20 wherein R^9 and R^{10} are as defined above, provided that
both R^3 and R^4 cannot be OH, NH_2 , and SH, or

R^{11} and R^{12} together with the nitrogen or carbon
atom to which they are attached form a cyclic ring;

R^5 is aryl substituted with one or more OR^{13a} ,

25 wherein R^{13a} is selected from the group consisting
of polyether, aryl, alkylarylalkyl,
alkylheteroarylalkyl, alkylheterocyclylalkyl,
heterocyclylalkyl, heteroarylalkyl, quaternary
heterocyclylalkyl, alkylammoniumalkyl, and
30 carboxyalkylaminocarbonylalkyl,

R^{13a} is optionally substituted with one or more groups selected from the group consisting of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl, heterocycle, heteroaryl, sulfoalkyl, quaternary heterocycle, quaternary heteroaryl, quaternary heterocyclylalkyl, quaternary heteroarylalkyl, guanidinyll, OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{10}R^{11}A^-$, $S^+R^9R^{10}A^-$, and $C(O)OM$,

wherein A^- is an pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation,

wherein R^{16} and R^{17} are independently selected from the substituents constituting R^9 and M; and

R^6 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, OR^{30} , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 ,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, and quaternary heteroaryl can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $NR^{13}C(O)R^{14}$, $NR^{13}C(O)NR^{14}R^{15}$, $NR^{13}CO_2R^{14}$, $OC(O)R^{13}$, $OC(O)NR^{13}R^{14}$, $NR^{13}SOR^{14}$, $NR^{13}SO_2R^{14}$, $NR^{13}SONR^{14}R^{15}$,

$\text{NR}^{13}\text{SO}_2\text{NR}^{14}\text{R}^{15}$, $\text{P}(\text{O})\text{R}^{13}\text{R}^{14}$, $\text{P}^+\text{R}^{13}\text{R}^{14}\text{R}^{15}\text{A}^-$, $\text{P}(\text{OR}^{13})\text{OR}^{14}$,
 $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, and $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$,

wherein:

A^- is a pharmaceutically acceptable anion and M is
 5 a pharmaceutically acceptable cation,

said alkyl, alkenyl, alkynyl, polyalkyl,
 polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
 can be further substituted with one or more substituent

groups selected from the group consisting of OR^7 ,

10 NR^7R^8 , SR^7 , $\text{S}(\text{O})\text{R}^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN, oxo,

CONR^7R^8 , $\text{N}^+\text{R}^7\text{R}^8\text{R}^9\text{A}^-$, alkyl, alkenyl, alkynyl, aryl,
 cycloalkyl, heterocycle, arylalkyl, quaternary

heterocycle, quaternary heteroaryl, $\text{P}(\text{O})\text{R}^7\text{R}^8$,

$\text{P}^+\text{R}^7\text{R}^8\text{R}^9\text{A}^-$, and $\text{P}(\text{O})(\text{OR}^7)\text{OR}^8$, and

15 wherein said alkyl, alkenyl, alkynyl, polyalkyl,
 polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
 can optionally have one or more carbons replaced by O,

NR^7 , $\text{N}^+\text{R}^7\text{R}^8\text{A}^-$, S, SO, SO_2 , $\text{S}^+\text{R}^7\text{A}^-$, PR^7 , $\text{P}(\text{O})\text{R}^7$,

$\text{P}^+\text{R}^7\text{R}^8\text{A}^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are

20 independently selected from the group consisting of

hydrogen, alkyl, alkenyl, alkynyl, polyalkyl,

polyether, aryl, arylalkyl, alkylarylalkyl,

alkylheteroarylalkyl, alkylheterocyclalkyl,

cycloalkyl, heterocycle, heteroaryl, quaternary

25 heterocycle, quaternary heteroaryl, heterocyclalkyl,

heteroarylalkyl, quaternary heterocyclalkyl,

quaternary heteroarylalkyl, alkylammoniumalkyl, and

carboxyalkylaminocarbonylalkyl,

wherein alkyl, alkenyl, alkynyl, arylalkyl,

30 heterocycle, and polyalkyl optionally have one or more

carbons replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S, SO, SO_2 ,

$S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, $P(O)R^9$, phenylene, carbohydrate, amino acid, peptide, or polypeptide, and

R^{13} , R^{14} , and R^{15} are optionally substituted with one or more groups selected from the group consisting of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl, heterocycle, heteroaryl, sulfoalkyl, quaternary heterocycle, quaternary heteroaryl, quaternary heterocyclalkyl, quaternary heteroaryalkyl, guanidiny, OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{10}R^{11}A^-$, $S^+R^9R^{10}A^-$, and $C(O)OM$,

wherein R^{16} and R^{17} are independently selected from the substituents constituting R^9 and M; or

R^{13} and R^{14} , together with the nitrogen atom to which they are attached form a mono- or polycyclic heterocycle that is optionally substituted with one or more radicals selected from the group consisting of oxo, carboxy and quaternary salts; or

R^{14} and R^{15} , together with the nitrogen atom to which they are attached, form a cyclic ring; and

R^{30} is selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, alkylammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroaryalkyl, heterocyclalkyl, and alkylammoniumalkyl; and

R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl; and

one or more R^x are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl,

polyalkyl, acyloxy, aryl, arylalkyl, halogen,
haloalkyl, cycloalkyl, heterocycle, heteroaryl,
polyether, quaternary heterocycle, quaternary
heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$,
5 SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} ,
 CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$,
 $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$,
 $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid,
peptide, polypeptide, and carbohydrate,

10 wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl,
polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl,
polyether, quaternary heterocycle, and quaternary
heteroaryl can be further substituted with OR^9 , NR^9R^{10} ,
 $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 ,
15 CN , halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$,
 $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting
of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle,
heteroaryl, alkyl,

20 wherein acyl, arylalkoxycarbonyl, arylalkyl,
heterocycle, heteroaryl, alkyl, quaternary heterocycle,
and quaternary heteroaryl optionally are substituted
with one or more substituents selected from the group
consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$,
25 SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_3R^9 ,
 SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

wherein in R^X , one or more carbons are optionally
replaced by O , NR^{13} , $N^+R^{13}R^{14}A^-$, S , SO , SO_2 , $S^+R^{13}A^-$,
 PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid,

peptide, polypeptide, carbohydrate, polyether, or polyalkyl,

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S, SO, SO_2 , $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, or $\text{P}(\text{O})\text{R}^9$;

wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, SR^{13} , $\text{S}(\text{O})\text{R}^{13}$, SO_2R^{13} , SO_3R^{13} , $\text{NR}^{13}\text{OR}^{14}$, $\text{NR}^{13}\text{NR}^{14}\text{R}^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $\text{SO}_2\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{OM}$, COR^{13} , $\text{P}(\text{O})\text{R}^{13}\text{R}^{14}$, $\text{P}^+\text{R}^{13}\text{R}^{14}\text{R}^{15}\text{A}^-$, $\text{P}(\text{OR}^{13})\text{OR}^{14}$, $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, and $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, or

a pharmaceutically acceptable salt, solvate, or prodrug thereof.

181. A compound of claim 180 wherein:

R^5 is phenyl substituted with OR^{13a} ;

R^{13a} is independently selected from the group consisting of polyether, alkylarylalkyl, alkylheteroarylalkyl, alkylheterocyclalkyl, and carboxyalkylaminocarbonylalkyl; and

R^{13a} is optionally substituted with one or more groups selected from the group consisting of carboxy, quaternary heterocycle, quaternary heteroaryl, and NR^9R^{10} .

182. A compound of claim 180 wherein n is 1 or 2.

183. A compound of claim 180 wherein R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl.

5

184. A compound of claim 180 wherein R^7 and R^8 are hydrogen.

185. A compound of claim 180 wherein R^8 and R^4 are independently selected from the group consisting of hydrogen and OR^9 .

10

186. A compound of claim 180 wherein R^3 is hydrogen and R^4 is hydroxy.

15

187. A compound of claim 180 wherein one or more R^x are independently selected from the group consisting of OR^{13} and $NR^{13}R^{14}$.

20

188. A compound of claim 180 wherein one or more R^x are independently selected from methoxy and dimethylamino.

189. A compound of claim 180 wherein R^1 and R^2 are independently selected from the group consisting of hydrogen and alkyl.

25

190. A compound of claim 180 wherein R^1 and R^2 are independently selected from the group consisting alkyl.

30

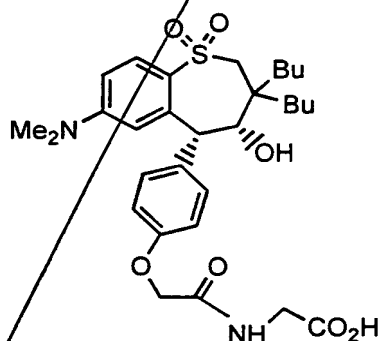
191. A compound of claim 180 wherein R^1 and R^2 are the same alkyl.

192. A compound of claim 180 wherein R^1 and R^2 are each n-butyl.

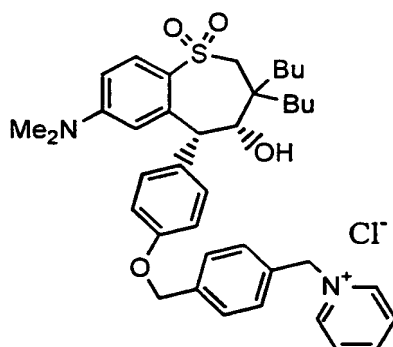
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193. A compound of claim 180 wherein
n is 1 or 2;
R¹ and R² are n-butyl;
R³ and R⁶ are hydrogen;
R⁴ is hydroxy;
R⁷ and R⁸ are hydrogen; and
one or more R^x are independently selected from
methoxy and dimethylamino.

194. A compound of claim 180 having the structural formula:



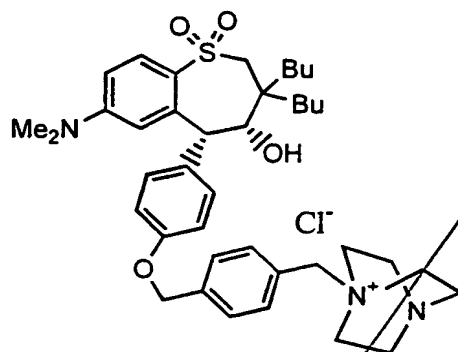
195. A compound of claim 180 having the structural formula:



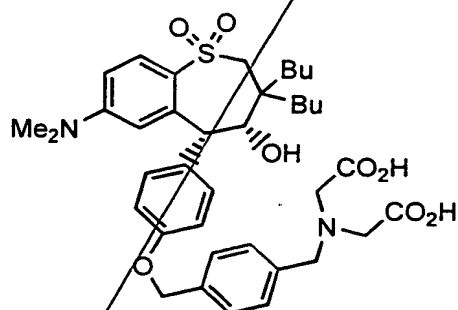
196. A compound of claim 180 having the structural formula:

SRL 6071
(C-3021/2)

596

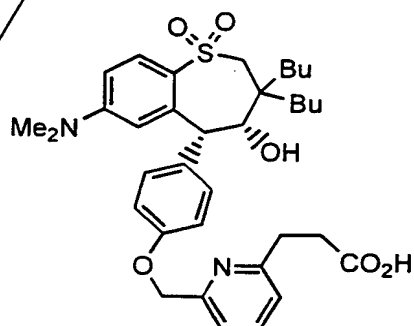


197. A compound of claim 180 having the structural formula:



5

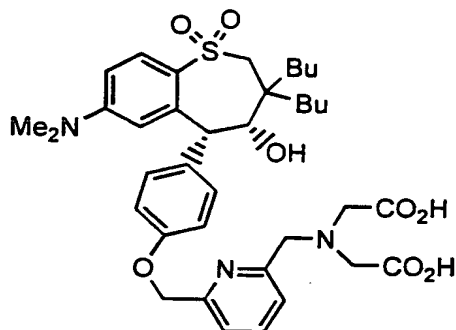
198. A compound of claim 180 having the structural formula:



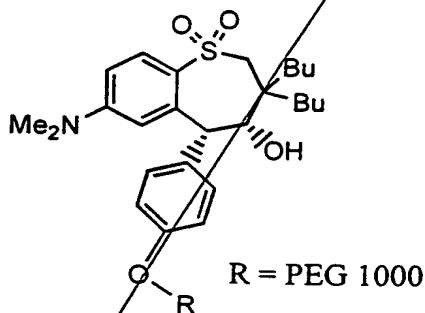
199. A compound of claim 180 having the structural formula:

SRL 6071
(C-3021/2)

597

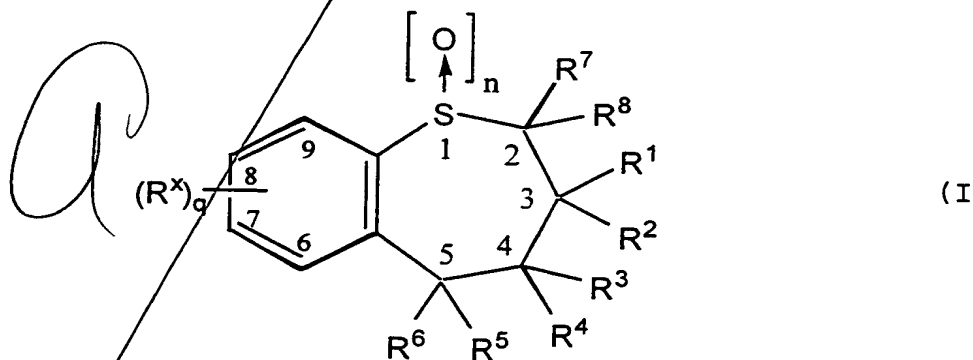


200. A compound of claim 180 having the structural formula:



5

201. A compound of formula (I):



wherein:

q is an integer from 1 to 4;

n is an integer from 0 to 2;

R¹ and R² are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and

10

cycloalkyl,

wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{10}R^WA^-$, SR^9 , $S^+R^9R^{10}A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

wherein alkyl, alkenyl, alkynyl, alkylaryl, alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^W are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclylalkyl, and alkylammoniumalkyl; or

R^1 and R^2 taken together with the carbon to which they are attached form C_3 - C_{10} cycloalkyl;

R^3 and R^4 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, acyloxy, aryl, heterocycle, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 , wherein R^9 and R^{10} are as defined above; or

R^3 and R^4 together form $=O$, $=NOR^{11}$, $=S$, $=NNR^{11}R^{12}$, $=NR^9$, or $=CR^{11}R^{12}$,

wherein R^{11} and R^{12} are independently selected

from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl, heterocycle, carboxyalkyl, carboalkoxyalkyl, cycloalkyl, cyanoalkyl, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,
5 wherein R^9 and R^{10} are as defined above, provided that both R^3 and R^4 cannot be OH, NH_2 , and SH, or

R^{11} and R^{12} together with the nitrogen or carbon atom to which they are attached form a cyclic ring;

10 R^5 is aryl substituted with one or more OR^{13b} ,

wherein R^{13b} is selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, arylalkyl, alkylarylalkyl, alkylheteroarylalkyl, alkylheterocyclalkyl, cycloalkyl, heterocycle, heteroaryl, quaternary heterocycle, quaternary heteroaryl, heterocyclalkyl, heteroarylalkyl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, alkylammoniumalkyl, and carboxyalkylaminocarbonylalkyl,

20 R^{13b} is substituted with one or more groups selected from the group consisting of hydroxy, amino, sulfo, carboxy, carboxyalkyl, heterocycle, heteroaryl, sulfoalkyl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, or guanidiny, and

25 R^6 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, OR^{30} , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 ,

30 wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, and quaternary heteroaryl can be substituted with one or more

substituent groups independently selected from the
group consisting of alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, heterocycle,
arylalkyl, quaternary heterocycle, quaternary
5 heteroaryl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$,
 SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN ,
 OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} ,
 $NR^{13}C(O)R^{14}$, $NR^{13}C(O)NR^{14}R^{15}$, $NR^{13}CO_2R^{14}$, $OC(O)R^{13}$,
 $OC(O)NR^{13}R^{14}$, $NR^{13}SOR^{14}$, $NR^{13}SO_2R^{14}$, $NR^{13}SONR^{14}R^{15}$,
10 $NR^{13}SO_2NR^{14}R^{15}$, $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$,
 $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

wherein:

A^- is a pharmaceutically acceptable anion and M is
a pharmaceutically acceptable cation,

15 said alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can be further substituted with one or more substituent
groups selected from the group consisting of OR^7 ,
 NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo,
20 $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl,
cycloalkyl, heterocycle, arylalkyl, quaternary
heterocycle, quaternary heteroaryl, $P(O)R^7R^8$,
 $P^+R^7R^8R^9A^-$, and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl,
25 polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can optionally have one or more carbons replaced by O,
 NR^7 , $N^+R^7R^8A^-$, S, SO, SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$,
 $P^+R^7R^8A^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are
independently selected from the group consisting of
30 hydrogen, alkyl, alkenyl, alkynyl, polyalkyl,

polyether, aryl, arylalkyl, alkylarylalkyl,
alkylheteroarylalkyl, alkylheterocyclalkyl,
cycloalkyl, heterocycle, heteroaryl, quaternary
heterocycle, quaternary heteroaryl, heterocyclalkyl,
5 heteroarylalkyl, quaternary heterocyclalkyl,
quaternary heteroarylalkyl, alkylammoniumalkyl, and
carboxyalkylaminocarbonylalkyl,

wherein alkyl, alkenyl, alkynyl, arylalkyl,
heterocycle, and polyalkyl optionally have one or more
10 carbons replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S, SO, SO_2 ,
 $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, $\text{P}(\text{O})\text{R}^9$, phenylene, carbohydrate,
amino acid, peptide, or polypeptide, and

R^{13} , R^{14} , and R^{15} are optionally substituted with
one or more groups selected from the group consisting
15 of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl,
heterocycle, heteroaryl, sulfoalkyl, quaternary
heterocycle, quaternary heteroaryl, quaternary
heterocyclalkyl, quaternary heteroarylalkyl,
guanidinyl, OR^9 , NR^9R^{10} , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, SR^9 , $\text{S}(\text{O})\text{R}^9$,
20 SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $\text{CONR}^9\text{R}^{10}$, SO_2OM ,
 $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$, $\text{P}^+\text{R}^9\text{R}^{10}\text{R}^{11}\text{A}^-$, $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, and
 $\text{C}(\text{O})\text{OM}$,

wherein R^{16} and R^{17} are independently selected
from the substituents constituting R^9 and M; or

25 R^{13} and R^{14} , together with the nitrogen atom to
which they are attached form a mono- or polycyclic
heterocycle that is optionally substituted with one or
more radicals selected from the group consisting of
oxo, carboxy and quaternary salts; or

30 R^{14} and R^{15} , together with the nitrogen atom to
which they are attached, form a cyclic ring; and

R^{30} is selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, alkylammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclalkyl, and alkylammoniumalkyl; and

R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl; and

one or more R^x are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heteroaryl, polyether, quaternary heterocycle, quaternary heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl,

heterocycle, heteroaryl, alkyl, quaternary heterocycle,
and quaternary heteroaryl optionally are substituted
with one or more substituents selected from the group
consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$,
5 SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_3R^9 ,
 SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

wherein in R^x , one or more carbons are optionally
replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$,
 PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid,
10 peptide, polypeptide, carbohydrate, polyether, or
polyalkyl,

wherein in said polyalkyl, phenylene, amino acid,
peptide, polypeptide, and carbohydrate, one or more
carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$,
15 S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$;

wherein quaternary heterocycle and quaternary
heteroaryl are optionally substituted with one or more
groups selected from the group consisting of alkyl,
alkenyl, alkynyl, polyalkyl, polyether, aryl,
20 haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen,
oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} ,
 $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM ,
 $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$,
 $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and
25 $N^+R^9R^{11}R^{12}A^-$, or

a pharmaceutically acceptable salt, solvate, or
prodrug thereof.

202. A compound of claim 201 wherein:
30 R^5 is phenyl substituted with OR^{13b} ;

R^{13b} is independently selected from the group consisting of alkyl, quaternary heteroarylalkyl, and quaternary heterocyclalkyl; and

5 R^{13b} is substituted with one or more groups selected from the group consisting of hydroxy, heterocycle, heteroaryl, and guanidiny.

203. A compound of claim 201 wherein n is 1 or 2.

10 204. A compound of claim 201 wherein R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl.

15 205. A compound of claim 201 wherein R^7 and R^8 are hydrogen.

20 206. A compound of claim 201 wherein R^3 and R^4 are independently selected from the group consisting of hydrogen and OR^9 .

207. A compound of claim 201 wherein R^3 is hydrogen and R^4 is hydroxy.

25 208. A compound of claim 201 wherein one or more R^x are independently selected from the group consisting of OR^{13} and $NR^{13}R^{14}$.

30 209. A compound of claim 201 wherein one or more R^x are independently selected from methoxy and dimethylamino.

35 210. A compound of claim 201 wherein R^1 and R^2 are independently selected from the group consisting of hydrogen and alkyl.

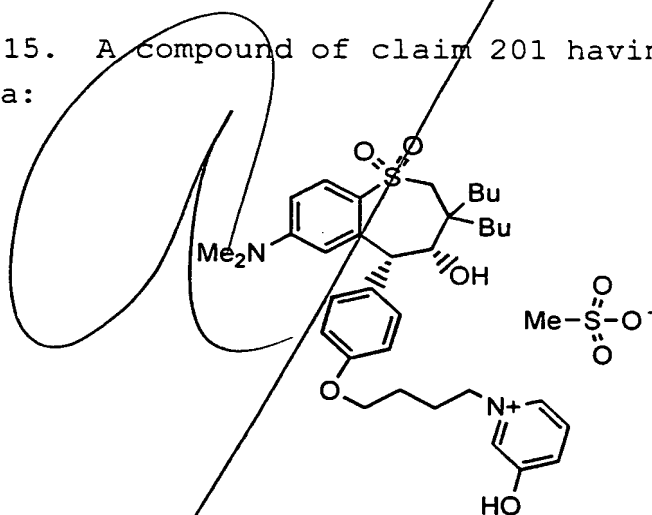
211. A compound of claim 201 wherein R^1 and R^2 are independently selected from the group consisting alkyl.

212. A compound of claim 201 wherein R^1 and R^2 are the same alkyl.

213. A compound of claim 201 wherein R^1 and R^2 are each n-butyl.

214. A compound of claim 201 wherein
n is 1 or 2;
 R^1 and R^2 are n-butyl;
 R^3 and R^6 are hydrogen;
 R^4 is hydroxy;
 R^7 and R^8 are hydrogen; and
one or more R^x are independently selected from methoxy and dimethylamino.

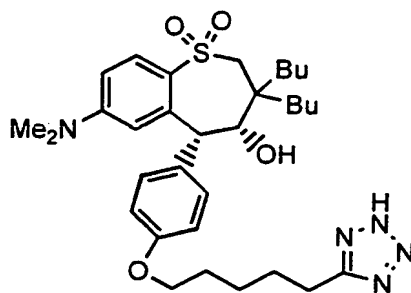
215. A compound of claim 201 having the structural formula:



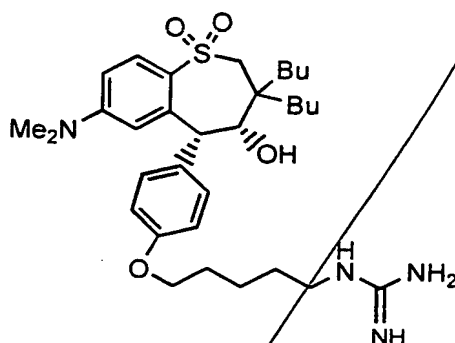
216. A compound of claim 201 having the structural formula:

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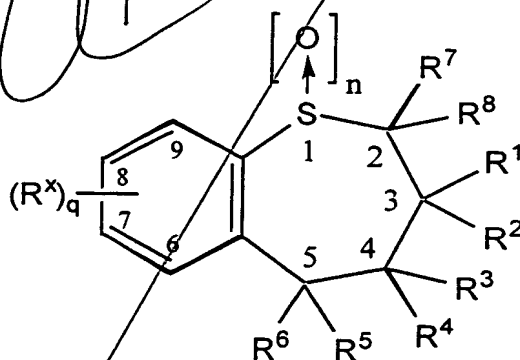


217. A compound of claim 201 having the structural formula:



5

218. A compound of formula (I):



(I)

wherein:

q is an integer from 1 to 4;

n is an integer from 0 to 2;

R^1 and R^2 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl,

10

15

wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more
 5 substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{10}R^wA^-$, SR^9 , $S^+R^9R^{10}A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

wherein alkyl, alkenyl, alkynyl, alkylaryl, alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl
 10 optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^w are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carbalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclylalkyl, and alkylammoniumalkyl; or
 15

R^1 and R^2 taken together with the carbon to which they are attached form C_3 - C_{10} cycloalkyl;
 20

R^3 and R^4 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, acyloxy, aryl, heterocycle, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 , wherein R^9 and R^{10} are as defined
 25 above; or

R^3 and R^4 together form $=O$, $=NOR^{11}$, $=S$, $=NNR^{11}R^{12}$, $=NR^9$, or $=CR^{11}R^{12}$,

wherein R^{11} and R^{12} are independently selected from the group consisting of H, alkyl, alkenyl,
 30

alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl,
 heterocycle, carboxyalkyl, carboalkoxyalkyl,
 cycloalkyl, cyanoalkyl, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$,
 SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,
 5 wherein R^9 and R^{10} are as defined above, provided that
 both R^3 and R^4 cannot be OH, NH_2 , and SH, or

R^{11} and R^{12} together with the nitrogen or carbon
 atom to which they are attached form a cyclic ring;

R^5 is aryl substituted with one or more OR^{13b} ,

10 wherein R^{13b} is selected from the group consisting
 of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl,
 arylalkyl, alkylarylalkyl, alkylheteroarylalkyl,
 alkylheterocyclalkyl, cycloalkyl, heterocycle,
 heteroaryl, quaternary heterocycle, quaternary
 15 heteroaryl, heterocyclalkyl, heteroarylalkyl,
 quaternary heterocyclalkyl, quaternary
 heteroarylalkyl, alkylammoniumalkyl, and
 carboxyalkylaminocarbonylalkyl,

R^{13b} is substituted with one or more groups
 20 selected from the group consisting of OR^{9a} , $NR^{9a}R^{10}$,
 $N^+R^{9a}R^{11}R^{12}A^-$, SR^{9a} , $S(O)R^{9a}$, SO_2R^{9a} , SO_3R^{9a} , CO_2R^{9a} ,
 $CONR^{9a}R^{10}$, $SO_2NR^{9a}R^{10}$, $P^+R^{9a}R^{10}R^{11}A^-$, and $S^+R^{9a}R^{10}A^-$,

wherein A^- is an pharmaceutically acceptable anion
 and M is a pharmaceutically acceptable cation, and

25 wherein R^{9a} is selected from the group consisting
 of carboxyalkyl, carboxyheteroaryl, carboxyheterocycle,
 carboalkoxyalkyl, and carboxyalkylamino;

R^6 is selected from the group consisting of H,
 alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle,
 30 quaternary heterocycle, OR^{30} , SR^9 , $S(O)R^9$, SO_2R^9 , and

SO_3R^9 ,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, and quaternary heteroaryl can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, halogen, oxo, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, SR^{13} , $\text{S}(\text{O})\text{R}^{13}$, SO_2R^{13} , SO_3R^{13} , $\text{NR}^{13}\text{OR}^{14}$, $\text{NR}^{13}\text{NR}^{14}\text{R}^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $\text{SO}_2\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{OM}$, COR^{13} , $\text{NR}^{13}\text{C}(\text{O})\text{R}^{14}$, $\text{NR}^{13}\text{C}(\text{O})\text{NR}^{14}\text{R}^{15}$, $\text{NR}^{13}\text{CO}_2\text{R}^{14}$, $\text{OC}(\text{O})\text{R}^{13}$, $\text{OC}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{NR}^{13}\text{SOR}^{14}$, $\text{NR}^{13}\text{SO}_2\text{R}^{14}$, $\text{NR}^{13}\text{SONR}^{14}\text{R}^{15}$, $\text{NR}^{13}\text{SO}_2\text{NR}^{14}\text{R}^{15}$, $\text{P}(\text{O})\text{R}^{13}\text{R}^{14}$, $\text{P}^+\text{R}^{13}\text{R}^{14}\text{R}^{15}\text{A}^-$, $\text{P}(\text{OR}^{13})\text{OR}^{14}$, $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, and $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$,

wherein:

A^- is a pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation, said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $\text{S}(\text{O})\text{R}^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo, CONR^7R^8 , $\text{N}^+\text{R}^7\text{R}^8\text{R}^9\text{A}^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, $\text{P}(\text{O})\text{R}^7\text{R}^8$, $\text{P}^+\text{R}^7\text{R}^8\text{R}^9\text{A}^-$, and $\text{P}(\text{O})(\text{OR}^7)\text{OR}^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O,

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NR⁷, N⁺R⁷R⁸A⁻, S, SO, SO₂, S⁺R⁷A⁻, PR⁷, P(O)R⁷,
P⁺R⁷R⁸A⁻, or phenylene, and R¹³, R¹⁴, and R¹⁵ are
independently selected from the group consisting of
hydrogen, alkyl, alkenyl, alkynyl, polyalkyl,
5 polyether, aryl, arylalkyl, alkylarylalkyl,
alkylheteroarylalkyl, alkylheterocyclalkyl,
cycloalkyl, heterocycle, heteroaryl, quaternary
heterocycle, quaternary heteroaryl, heterocyclalkyl,
heteroarylalkyl, quaternary heterocyclalkyl,
10 quaternary heteroarylalkyl, alkylammoniumalkyl, and
carboxyalkylaminocarbonylalkyl,

wherein alkyl, alkenyl, alkynyl, arylalkyl,
heterocycle, and polyalkyl optionally have one or more
carbons replaced by O, NR⁹, N⁺R⁹R¹⁰A⁻, S, SO, SO₂,
15 S⁺R⁹A⁻, PR⁹, P⁺R⁹R¹⁰A⁻, P(O)R⁹, phenylene, carbohydrate,
amino acid, peptide, or polypeptide, and

R¹³, R¹⁴, and R¹⁵ are optionally substituted with
one or more groups selected from the group consisting
of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl,
20 heterocycle, heteroaryl, sulfoalkyl, quaternary
heterocycle, quaternary heteroaryl, quaternary
heterocyclalkyl, quaternary heteroarylalkyl,
guanidinyll, OR⁹, NR⁹R¹⁰, N⁺R⁹R¹¹R¹²A⁻, SR⁹, S(O)R⁹,
SO₂R⁹, SO₃R⁹, oxo, CO₂R⁹, CN, halogen, CONR⁹R¹⁰, SO₂OM,
25 SO₂NR⁹R¹⁰, PO(OR¹⁶)OR¹⁷, P⁺R⁹R¹⁰R¹¹A⁻, S⁺R⁹R¹⁰A⁻, and
C(O)OM,

wherein R¹⁶ and R¹⁷ are independently selected
from the substituents constituting R⁹ and M; or
R¹³ and R¹⁴, together with the nitrogen atom to
30 which they are attached form a mono- or polycyclic
heterocycle that is optionally substituted with one or

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more radicals selected from the group consisting of oxo, carboxy and quaternary salts; or

R^{14} and R^{15} , together with the nitrogen atom to which they are attached, form a cyclic ring; and

5 R^{30} is selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, alkylammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclalkyl, and alkylammoniumalkyl; and

10 R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl; and

one or more R^x are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heteroaryl, polyether, quaternary heterocycle, quaternary heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} ,
20 CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

25 wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$,
30 $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

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wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl,

5 wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl, quaternary heterocycle, and quaternary heteroaryl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_3R^9 ,
10 SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

wherein in R^x , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or
15 polyalkyl,

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$;

20 wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen,
25 oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$, or

a pharmaceutically acceptable salt, solvate, or prodrug thereof.

5 219. A compound of claim 218 wherein:

R^5 is phenyl substituted with OR^{13b} ;

R^{13b} is alkyl; and

R^{13b} is substituted with one or more groups selected from the group consisting of OR^{9a} and $NR^{9a}R^{10}$; and

10 R^{9a} is selected from the group consisting of carboxyalkyl, carboxyheteroaryl, and carboxyheterocycle; and

R^{10} is carboxyalkyl.

15 220. A compound of claim 218 wherein n is 1 or 2.

221. A compound of claim 218 wherein R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl.

20 222. A compound of claim 218 wherein R^7 and R^8 are hydrogen.

25 223. A compound of claim 218 wherein R^3 and R^4 are independently selected from the group consisting of hydrogen and OR^9 .

224. A compound of claim 218 wherein R^3 is hydrogen and R^4 is hydroxy.

30 224. A compound of claim 218 wherein one or more R^x are independently selected from the group consisting of OR^{13} and $NR^{13}R^{14}$.

35 226. A compound of claim 218 wherein one or more R^x are independently selected from methoxy and

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dimethylamino.

5 227. A compound of claim 218 wherein R^1 and R^2 are independently selected from the group consisting of hydrogen and alkyl.

228. A compound of claim 218 wherein R^1 and R^2 are independently selected from the group consisting alkyl.

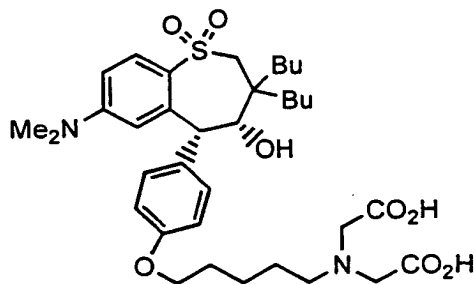
10 229. A compound of claim 218 wherein R^1 and R^2 are the same alkyl.

230. A compound of claim 218 wherein R^1 and R^2 are each n-butyl.

15 231. A compound of claim 218 wherein
n is 1 or 2;
 R^1 and R^2 are n-butyl;
 R^3 and R^6 are hydrogen;
20 R^4 is hydroxy;

R^7 and R^8 are hydrogen; and
one or more R^i are independently selected from
methoxy and dimethylamino.

25 232. A compound of claim 218 having the structural formula:

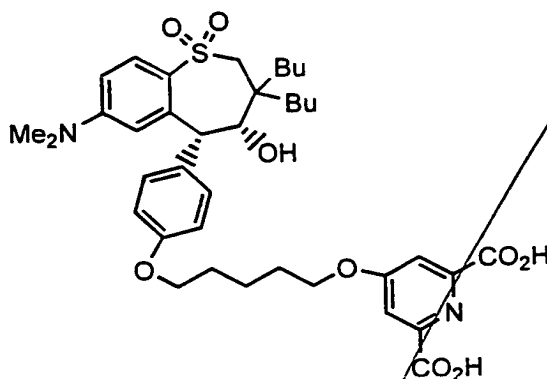


233. A compound of claim 218 having the structural

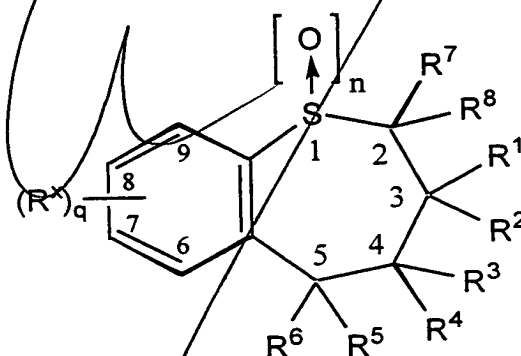
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formula:



234. A compound of formula (I):



(I)

wherein:

q is an integer from 1 to 4;

n is an integer from 0 to 2;

R¹ and R² are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl,

wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more substituents selected from the group consisting of OR⁹,

NR^9R^{10} , $\text{N}^+\text{R}^9\text{R}^{10}\text{R}^{\text{w}}\text{A}^-$, SR^9 , $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, $\text{P}^+\text{R}^9\text{R}^{10}\text{R}^{11}\text{A}^-$,
 $\text{S}(\text{O})\text{R}^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and
 $\text{CONR}^9\text{R}^{10}$,

5 wherein alkyl, alkenyl, alkynyl, alkylaryl,
 alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl
 optionally have one or more carbons replaced by O, NR^9 ,
 $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S, SO, SO_2 , $\text{S}^+\text{R}^9\text{A}^-$, $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, or phenylene,

10 wherein R^9 , R^{10} , and R^{w} are independently selected
 from the group consisting of H, alkyl, alkenyl,
 alkynyl, cycloalkyl, aryl, acyl, heterocycle,
 ammoniumalkyl, arylalkyl, carboxyalkyl,
 carboxyheteroaryl, carboxyheterocycle,
 carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl,
 heterocyclylalkyl, and alkylammoniumalkyl; or

15 R^1 and R^2 taken together with the carbon to which
 they are attached form C_3 - C_{10} cycloalkyl;

20 R^3 and R^4 are independently selected from the
 group consisting of H, alkyl, alkenyl, alkynyl,
 acyloxy, aryl, heterocycle, OR^9 , NR^9R^{10} , SR^9 , $\text{S}(\text{O})\text{R}^9$,
 SO_2R^9 , and SO_3R^9 , wherein R^9 and R^{10} are as defined
 above; or

R^3 and R^4 together form $=\text{O}$, $=\text{NOR}^{11}$, $=\text{S}$, $=\text{NNR}^{11}\text{R}^{12}$,
 $=\text{NR}^9$, or $=\text{CR}^{11}\text{R}^{12}$,

25 wherein R^{11} and R^{12} are independently selected
 from the group consisting of H, alkyl, alkenyl,
 alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl,
 heterocycle, carboxyalkyl, carboalkoxyalkyl,
 cycloalkyl, cyanoalkyl, OR^9 , NR^9R^{10} , SR^9 , $\text{S}(\text{O})\text{R}^9$,
 SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $\text{CONR}^9\text{R}^{10}$,

wherein R^9 and R^{10} are as defined above, provided that both R^3 and R^4 cannot be OH, NH_2 , and SH, or

R^{11} and R^{12} together with the nitrogen or carbon atom to which they are attached form a cyclic ring;

5 R^5 is aryl substituted with one or more OR^{13b} ,

wherein R^{13b} is selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, arylalkyl, alkylarylalkyl, alkylheteroarylalkyl, alkylheterocyclalkyl, cycloalkyl, heterocycle, heteroaryl, quaternary heterocycle, quaternary heteroaryl, heterocyclalkyl, heteroarylalkyl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, alkylammoniumalkyl, and carboxyalkylaminocarbonylalkyl,

15 R^{13b} is substituted with one or more groups selected from the group consisting of NR^9R^{10a} , $CONR^9R^{10a}$, $SO_2NR^9R^{10a}$, $P^+R^9R^{10a}R^{11}A^-$, and $S^+R^9R^{10a}A^-$,

wherein A^- is an pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation,

20 wherein R^{10a} is selected from the group consisting of carboxyalkyl, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, and heterocyclalkyl; or

R^6 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, OR^{30} , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 ,

25 wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, and quaternary heteroaryl can be substituted with one or more
30 substituent groups independently selected from the

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group consisting of alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, heterocycle,
arylalkyl, quaternary heterocycle, quaternary
heteroaryl, halogen, oxo, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, SR^{13} , $\text{S}(\text{O})\text{R}^{13}$,
5 SO_2R^{13} , SO_3R^{13} , $\text{NR}^{13}\text{OR}^{14}$, $\text{NR}^{13}\text{NR}^{14}\text{R}^{15}$, NO_2 , CO_2R^{13} , CN ,
 OM , SO_2OM , $\text{SO}_2\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{OM}$, COR^{13} ,
 $\text{NR}^{13}\text{C}(\text{O})\text{R}^{14}$, $\text{NR}^{13}\text{C}(\text{O})\text{NR}^{14}\text{R}^{15}$, $\text{NR}^{13}\text{CO}_2\text{R}^{14}$, $\text{OC}(\text{O})\text{R}^{13}$,
 $\text{OC}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{NR}^{13}\text{SOR}^{14}$, $\text{NR}^{13}\text{SO}_2\text{R}^{14}$, $\text{NR}^{13}\text{SONR}^{14}\text{R}^{15}$,
10 $\text{NR}^{13}\text{SO}_2\text{NR}^{14}\text{R}^{15}$, $\text{P}(\text{O})\text{R}^{13}\text{R}^{14}$, $\text{P}^+\text{R}^{13}\text{R}^{14}\text{R}^{15}\text{A}^-$, $\text{P}(\text{OR}^{13})\text{OR}^{14}$,
 $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, and $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$,

wherein:

A^- is a pharmaceutically acceptable anion and M is
a pharmaceutically acceptable cation,
said alkyl, alkenyl, alkynyl, polyalkyl,
15 polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can be further substituted with one or more substituent
groups selected from the group consisting of OR^7 ,
 NR^7R^8 , SR^7 , $\text{S}(\text{O})\text{R}^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo,
 CONR^7R^8 , $\text{N}^+\text{R}^7\text{R}^8\text{R}^9\text{A}^-$, alkyl, alkenyl, alkynyl, aryl,
20 cycloalkyl, heterocycle, arylalkyl, quaternary
heterocycle, quaternary heteroaryl, $\text{P}(\text{O})\text{R}^7\text{R}^8$,
 $\text{P}^+\text{R}^7\text{R}^8\text{R}^9\text{A}^-$, and $\text{P}(\text{O})(\text{OR}^7)\text{OR}^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
25 can optionally have one or more carbons replaced by O,
 NR^7 , $\text{N}^+\text{R}^7\text{R}^8\text{A}^-$, S, SO, SO_2 , $\text{S}^+\text{R}^7\text{A}^-$, PR^7 , $\text{P}(\text{O})\text{R}^7$,
 $\text{P}^+\text{R}^7\text{R}^8\text{A}^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are
independently selected from the group consisting of
hydrogen, alkyl, alkenyl, alkynyl, polyalkyl,
30 polyether, aryl, arylalkyl, alkylarylalkyl,

alkylheteroarylalkyl, alkylheterocyclalkyl,
cycloalkyl, heterocycle, heteroaryl, quaternary
heterocycle, quaternary heteroaryl, heterocyclalkyl,
heteroarylalkyl, quaternary heterocyclalkyl,
5 quaternary heteroarylalkyl, alkylammoniumalkyl, and
carboxyalkylaminocarbonylalkyl,

wherein alkyl, alkenyl, alkynyl, arylalkyl,
heterocycle, and polyalkyl optionally have one or more
carbons replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S, SO, SO_2 ,
10 $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, $\text{P}(\text{O})\text{R}^9$, phenylene, carbohydrate,
amino acid, peptide, or polypeptide, and

R^{13} , R^{14} , and R^{15} are optionally substituted with
one or more groups selected from the group consisting
of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl,
15 heterocycle, heteroaryl, sulfoalkyl, quaternary
heterocycle, quaternary heteroaryl, quaternary
heterocyclalkyl, quaternary heteroarylalkyl,
guanidiny, OR^9 , NR^9R^{10} , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, SR^9 , $\text{S}(\text{O})\text{R}^9$,
 SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $\text{CONR}^9\text{R}^{10}$, SO_2OM ,
20 $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$, $\text{P}^+\text{R}^9\text{R}^{10}\text{R}^{11}\text{A}^-$, $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, and
 $\text{C}(\text{O})\text{OM}$,

wherein R^{16} and R^{17} are independently selected
from the substituents constituting R^9 and M; or
 R^{13} and R^{14} , together with the nitrogen atom to
25 which they are attached form a mono- or polycyclic
heterocycle that is optionally substituted with one or
more radicals selected from the group consisting of
oxo, carboxy and quaternary salts; or

R^{14} and R^{15} , together with the nitrogen atom to
30 which they are attached, form a cyclic ring; and

R^{30} is selected from the group consisting of alkyl,
alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle,

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ammoniumalkyl, alkylammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclylalkyl, and alkylammoniumalkyl; and

5 R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl; and

one or more R^x are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heteroaryl, polyether, quaternary heterocycle, quaternary heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

25 wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl, quaternary heterocycle, and quaternary heteroaryl optionally are substituted

with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_3R^9 , SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

5 wherein in R^x , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl,

10 wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$;

15 wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$, or

20 a pharmaceutically acceptable salt, solvate, or
25 prodrug thereof.

235. A compound of claim 234 wherein:

R^5 is phenyl substituted with OR^{13b} ;

R^{13b} is alkyl; and

30 R^{13b} is substituted with NR^9R^{10a} ; and

R^9 is hydrogen; and
 R^{10} is heteroarylalkyl.

236. A compound of claim 234 wherein n is 1 or 2.

5

237. A compound of claim 234 wherein R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl.

10

238. A compound of claim 234 wherein R^7 and R^8 are hydrogen.

15

239. A compound of claim 234 wherein R^3 and R^4 are independently selected from the group consisting of hydrogen and OR^9 .

20

240. A compound of claim 234 wherein R^3 is hydrogen and R^4 is hydroxy.

241. A compound of claim 234 wherein one or more R^x are independently selected from the group consisting of OR^{13} and $NR^{13}R^{14}$.

25

242. A compound of claim 234 wherein one or more R^x are independently selected from methoxy and dimethylamino.

30

243. A compound of claim 234 wherein R^1 and R^2 are independently selected from the group consisting of hydrogen and alkyl.

244. A compound of claim 234 wherein R^1 and R^2 are independently selected from the group consisting alkyl.

35

245. A compound of claim 234 wherein R^1 and R^2 are

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the same alkyl.

246. A compound of claim 234 wherein R^1 and R^2 are each n-butyl.

5

247. A compound of claim 234 wherein
n is 1 or 2;

R^1 and R^2 are n-butyl;

R^3 and R^6 are hydrogen;

10

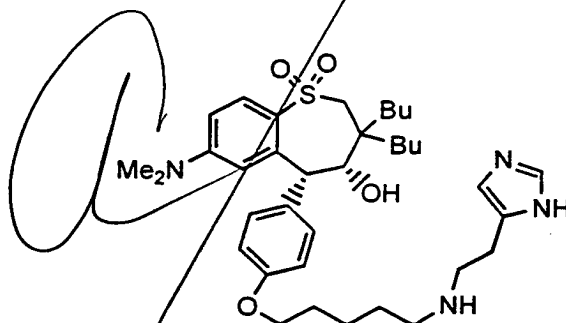
R^4 is hydroxy;

R^7 and R^8 are hydrogen; and

one or more R^x are independently selected from methoxy and dimethylamino.

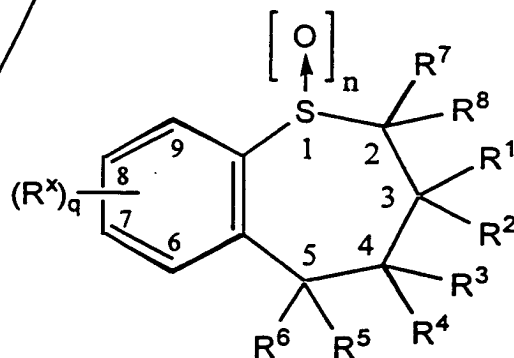
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248. A compound of claim 234 having the structural formula:



249. A compound of formula (I):

20



(I)

wherein:

q is an integer from 1 to 4;

n is an integer from 0 to 2;

R^1 and R^2 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl,

wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{10}R^wA^-$, SR^9 , $S^+R^9R^{10}A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

wherein alkyl, alkenyl, alkynyl, alkylaryl, alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^w are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclylalkyl, and alkylammoniumalkyl; or

R^1 and R^2 taken together with the carbon to which they are attached form C_3 - C_{10} cycloalkyl;

R^3 and R^4 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, acyloxy, aryl, heterocycle, OR^9 , NR^9R^{10} , SR^9 , $S(O)R^9$,

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SO_2R^9 , and SO_3R^9 , wherein R^9 and R^{10} are as defined above; or

R^3 and R^4 together form $=\text{O}$, $=\text{NOR}^{11}$, $=\text{S}$, $=\text{NNR}^{11}\text{R}^{12}$, $=\text{NR}^9$, or $=\text{CR}^{11}\text{R}^{12}$,

5 wherein R^{11} and R^{12} are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, arylalkyl, alkenylalkyl, alkynylalkyl, heterocycle, carboxyalkyl, carboalkoxyalkyl, cycloalkyl, cyanoalkyl, OR^9 , NR^9R^{10} , SR^9 , $\text{S}(\text{O})\text{R}^9$,
10 SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $\text{CONR}^9\text{R}^{10}$, wherein R^9 and R^{10} are as defined above, provided that both R^3 and R^4 cannot be OH, NH_2 , and SH, or

R^{11} and R^{12} together with the nitrogen or carbon atom to which they are attached form a cyclic ring;

15 R^5 is aryl substituted with one or more substituent groups independently selected from the group consisting of $\text{NR}^{13}\text{C}(\text{O})\text{R}^{14}$, $\text{NR}^{13}\text{C}(\text{O})\text{NR}^{14}\text{R}^{15}$, $\text{NR}^{13}\text{CO}_2\text{R}^{14}$, $\text{OC}(\text{O})\text{R}^{13}$, $\text{OC}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{NR}^{13}\text{SOR}^{14}$, $\text{NR}^{13}\text{SO}_2\text{R}^{14}$, $\text{NR}^{13}\text{SONR}^{14}\text{R}^{15}$, and $\text{NR}^{13}\text{SO}_2\text{NR}^{14}\text{R}^{15}$,

20 wherein:

R^{13} , R^{14} , and R^{15} are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, arylalkyl, alkylarylalkyl, alkylheteroarylalkyl,
25 alkylheterocyclalkyl, cycloalkyl, heterocycle, heteroaryl, quaternary heterocycle, quaternary heteroaryl, heterocyclalkyl, heteroarylalkyl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, alkylammoniumalkyl, and
30 carboxyalkylaminocarbonylalkyl,

R^{13} , R^{14} , and R^{15} are optionally substituted with

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one or more groups selected from the group consisting of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl, heterocycle, heteroaryl, sulfoalkyl, quaternary heterocycle, quaternary heteroaryl, quaternary heterocyclylalkyl, quaternary heteroarylalkyl, guanidinyll, OR^9 , NR^9R^{10} , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, SR^9 , $\text{S(O)}\text{R}^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $\text{CONR}^9\text{R}^{10}$, SO_2OM , $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO(OR}^{16})\text{OR}^{17}$, $\text{P}^+\text{R}^9\text{R}^{10}\text{R}^{11}\text{A}^-$, $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, and C(O)OM ,

wherein A^- is an pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation,

wherein R^{16} and R^{17} are independently selected from the substituents constituting R^9 and M; or

R^{13} and R^{14} , together with the nitrogen atom to which they are attached form a mono- or polycyclic heterocycle that is optionally substituted with one or more radicals selected from the group consisting of oxo, carboxy and quaternary salts; or

R^{14} and R^{15} , together with the nitrogen atom to which they are attached, form a cyclic ring; and

R^6 is selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, OR^{30} , SR^9 , $\text{S(O)}\text{R}^9$, SO_2R^9 , and SO_3R^9 ,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, and quaternary heteroaryl can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary

heteroaryl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$,
 SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN ,
 OM, SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} ,
 $NR^{13}C(O)R^{14}$, $NR^{13}C(O)NR^{14}R^{15}$, $NR^{13}CO_2R^{14}$, $OC(O)R^{13}$,
 5 $OC(O)NR^{13}R^{14}$, $NR^{13}SOR^{14}$, $NR^{13}SO_2R^{14}$, $NR^{13}SONR^{14}R^{15}$,
 $NR^{13}SO_2NR^{14}R^{15}$, $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$,
 $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

wherein:

10 A^- is a pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation,

said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent groups selected from the group consisting of OR^7 ,
 15 NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo, $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8R^9A^-$, and $P(O)(OR^7)OR^8$, and

20 wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O, NR^7 , $N^+R^7R^8A^-$, S, SO, SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$, $P^+R^7R^8A^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are
 25 independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, arylalkyl, alkylarylalkyl, alkylheteroarylalkyl, alkylheterocyclalkyl, cycloalkyl, heterocycle, heteroaryl, quaternary
 30 heterocycle, quaternary heteroaryl, heterocyclalkyl,

heteroarylalkyl, quaternary heterocyclalkyl,
quaternary heteroarylalkyl, alkylammoniumalkyl, and
carboxyalkylaminocarbonylalkyl,

5 wherein alkyl, alkenyl, alkynyl, arylalkyl,
heterocycle, and polyalkyl optionally have one or more
carbons replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S, SO, SO_2 ,
 $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, $\text{P}(\text{O})\text{R}^9$, phenylene, carbohydrate,
amino acid, peptide, or polypeptide, and

10 R^{13} , R^{14} , and R^{15} are optionally substituted with
one or more groups selected from the group consisting
of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl,
heterocycle, heteroaryl, sulfoalkyl, quaternary
heterocycle, quaternary heteroaryl, quaternary
heterocyclalkyl, quaternary heteroarylalkyl,
15 guanidinyll, OR^9 , NR^9R^{10} , $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$, SR^9 , $\text{S}(\text{O})\text{R}^9$,
 SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $\text{CONR}^9\text{R}^{10}$, SO_2OM ,
 $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$, $\text{P}^+\text{R}^9\text{R}^{10}\text{R}^{11}\text{A}^-$, $\text{S}^+\text{R}^9\text{R}^{10}\text{A}^-$, and
 $\text{C}(\text{O})\text{OM}$,

20 wherein R^{16} and R^{17} are independently selected
from the substituents constituting R^9 and M; or

R^{13} and R^{14} , together with the nitrogen atom to
which they are attached form a mono- or polycyclic
heterocycle that is optionally substituted with one or
more radicals selected from the group consisting of
25 oxo, carboxy and quaternary salts; or

R^{14} and R^{15} , together with the nitrogen atom to
which they are attached, form a cyclic ring; and

30 R^{30} is selected from the group consisting of alkyl,
alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle,
ammoniumalkyl, alkylammoniumalkyl, arylalkyl,
carboxyalkyl, carboxyheteroaryl, carboxyheterocycle,
carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl,

heterocyclalkyl, and alkylammoniumalkyl; and

R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl; and

one or more R^x are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heteroaryl, polyether, quaternary heterocycle, quaternary heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl, quaternary heterocycle, and quaternary heteroaryl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_3R^9 ,

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SO₂OM, SO₂NR⁹R¹⁰, PO(OR¹⁶)OR¹⁷, and C(O)OM,

wherein in R^x, one or more carbons are optionally replaced by O, NR¹³, N⁺R¹³R¹⁴A⁻, S, SO, SO₂, S⁺R¹³A⁻, PR¹³, P(O)R¹³, P⁺R¹³R¹⁴A⁻, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl,

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR⁹, N⁺R⁹R¹⁰A⁻, S, SO, SO₂, S⁺R⁹A⁻, PR⁹, P⁺R⁹R¹⁰A⁻, or P(O)R⁹;

wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR¹³, NR¹³R¹⁴, SR¹³, S(O)R¹³, SO₂R¹³, SO₃R¹³, NR¹³OR¹⁴, NR¹³NR¹⁴R¹⁵, NO₂, CO₂R¹³, CN, OM, SO₂OM, SO₂NR¹³R¹⁴, C(O)NR¹³R¹⁴, C(O)OM, COR¹³, P(O)R¹³R¹⁴, P⁺R¹³R¹⁴R¹⁵A⁻, P(OR¹³)OR¹⁴, S⁺R¹³R¹⁴A⁻, and N⁺R⁹R¹¹R¹²A⁻, or

a pharmaceutically acceptable salt, solvate, or prodrug thereof.

250. A compound of claim 249 wherein R⁵ is aryl substituted with a radical selected from the group consisting of NR¹³C(O)NR¹⁴R¹⁵ and NR¹³CO₂R¹⁴.

251. A compound of claim 249 wherein R⁵ is phenyl substituted with a radical selected from the group consisting of NR¹³C(O)NR¹⁴R¹⁵ and NR¹³CO₂R¹⁴.

252. A compound of claim 249 wherein n is 1 or 2.

5 253. A compound of claim 249 wherein R^7 and R^8 are independently selected from the group consisting of hydrogen and alkyl.

10 254. A compound of claim 249 wherein R^7 and R^8 are hydrogen.

255. A compound of claim 249 wherein R^3 and R^4 are independently selected from the group consisting of hydrogen and OR^9 .

15 256. A compound of claim 249 wherein R^3 is hydrogen and R^4 is hydroxy.

20 257. A compound of claim 249 wherein one or more R^x are independently selected from the group consisting of OR^{13} and $NR^{13}R^{14}$.

25 258. A compound of claim 249 wherein one or more R^x are independently selected from methoxy and dimethylamino.

259. A compound of claim 249 wherein R^1 and R^2 are independently selected from the group consisting of hydrogen and alkyl.

30 260. A compound of claim 249 wherein R^1 and R^2 are independently selected from the group consisting alkyl.

35 261. A compound of claim 249 wherein R^1 and R^2 are the same alkyl.

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262. A compound of claim 249 wherein R^1 and R^2 are each n-butyl.

263. A compound of claim 249 wherein
n is 1 or 2;

R^1 and R^2 are n-butyl;

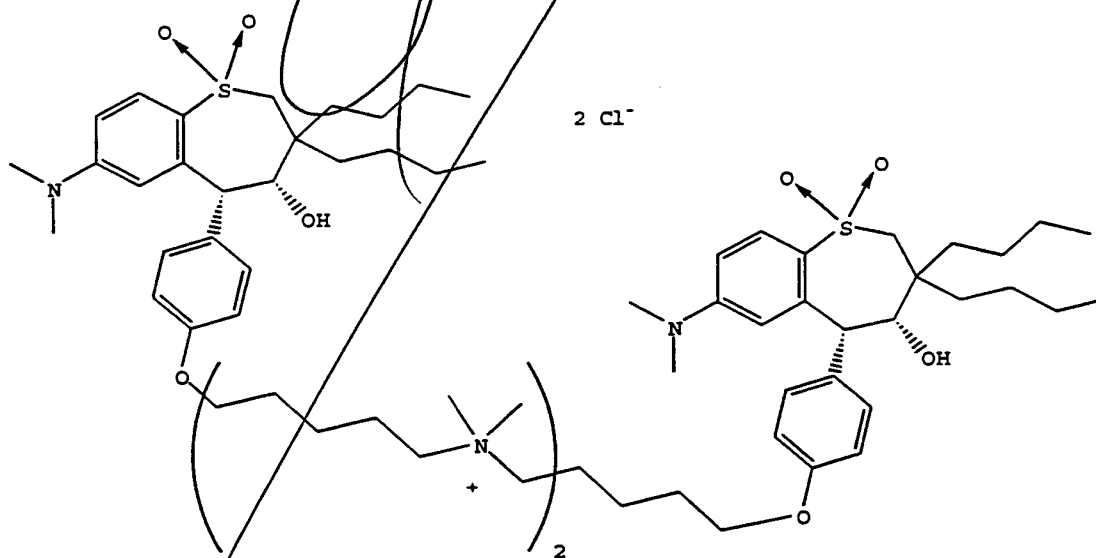
R^3 and R^6 are hydrogen;

R^4 is hydroxy;

R^7 and R^8 are hydrogen; and

one or more R^x are independently selected from methoxy and dimethylamino.

264. A compound of claim 98 having the structural formula:



265. A pharmaceutical composition comprising an anti-hyperlipidemic condition effective amount of a compound of formula (I) of claim 170, and

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a pharmaceutically acceptable carrier.

5 266. A pharmaceutical composition comprising an
anti-atherosclerotic effective amount of a compound of
formula (I) of claim 170, and
a pharmaceutically acceptable carrier.

10 267. A pharmaceutical composition comprising an
anti-hypercholesterolemia effective amount of a
compound of formula (I) of claim 170, and
a pharmaceutically acceptable carrier.

15 268. A method for the prophylaxis or treatment of
a hyperlipidemic condition comprising administering to
a patient in need thereof a composition of claim 265 in
unit dosage form.

20 269. A method for the prophylaxis or treatment of
an atherosclerotic condition comprising administering
to a patient in need thereof a composition of claim 266
in unit dosage form.

25 270. A method for the prophylaxis or treatment of
hypercholesterolemia comprising administering to a
patient in need thereof a composition of claim 267 in
unit dosage form.

30 271. A pharmaceutical composition comprising an
anti-hyperlipidemic condition effective amount of a
compound of formula (I) of claim 180, and
a pharmaceutically acceptable carrier.

35 272. A pharmaceutical composition comprising an
anti-atherosclerotic effective amount of a compound of
formula (I) of claim 180, and

a pharmaceutically acceptable carrier.

5 273. A pharmaceutical composition comprising an
anti-hypercholesterolemia effective amount of a
compound of formula (I) of claim 180, and
a pharmaceutically acceptable carrier.

10 274. A method for the prophylaxis or treatment of
a hyperlipidemic condition comprising administering to
a patient in need thereof a composition of claim 271 in
unit dosage form.

15 275. A method for the prophylaxis or treatment of
an atherosclerotic condition comprising administering
to a patient in need thereof a composition of claim 272
in unit dosage form.

20 276. A method for the prophylaxis or treatment of
hypercholesterolemia comprising administering to a
patient in need thereof a composition of claim 273 in
unit dosage form.

25 277. A pharmaceutical composition comprising an
anti-hyperlipidemic condition effective amount of a
compound of formula (I) of claim 201, and
a pharmaceutically acceptable carrier.

30 278. A pharmaceutical composition comprising an
anti-atherosclerotic effective amount of a compound of
formula (I) of claim 201, and
a pharmaceutically acceptable carrier.

35 279. A pharmaceutical composition comprising an
anti-hypercholesterolemia effective amount of a
compound of formula (I) of claim 201, and

a pharmaceutically acceptable carrier.

5 280. A method for the prophylaxis or treatment of
a hyperlipidemic condition comprising administering to
a patient in need thereof a composition of claim 277 in
unit dosage form.

10 281. A method for the prophylaxis or treatment of
an atherosclerotic condition comprising administering
to a patient in need thereof a composition of claim 278
in unit dosage form.

15 282. A method for the prophylaxis or treatment of
hypercholesterolemia comprising administering to a
patient in need thereof a composition of claim 279 in
unit dosage form.

20 283. A pharmaceutical composition comprising an
anti-hyperlipidemic effective amount of a
compound of formula (I) of claim 218, and
a pharmaceutically acceptable carrier.

25 284. A pharmaceutical composition comprising an
anti-atherosclerotic effective amount of a compound of
formula (I) of claim 218, and
a pharmaceutically acceptable carrier.

30 285. A pharmaceutical composition comprising an
anti-hypercholesterolemia effective amount of a
compound of formula (I) of claim 218, and
a pharmaceutically acceptable carrier.

35 286. A method for the prophylaxis or treatment of
a hyperlipidemic condition comprising administering to
a patient in need thereof a composition of claim 283 in

unit dosage form.

5 287. A method for the prophylaxis or treatment of
an atherosclerotic condition comprising administering
to a patient in need thereof a composition of claim 284
in unit dosage form.

10 288. A method for the prophylaxis or treatment of
hypercholesterolemia comprising administering to a
patient in need thereof a composition of claim 285 in
unit dosage form.

15 289. A pharmaceutical composition comprising an
anti-hyperlipidemic condition effective amount of a
compound of formula (I) of claim 234, and
a pharmaceutically acceptable carrier.

20 290. A pharmaceutical composition comprising an
anti-atherosclerotic effective amount of a compound of
formula (I) of claim 234, and
a pharmaceutically acceptable carrier.

25 291. A pharmaceutical composition comprising an
anti-hypercholesterolemia effective amount of a
compound of formula (I) of claim 234, and
a pharmaceutically acceptable carrier.

30 292. A method for the prophylaxis or treatment of
a hyperlipidemic condition comprising administering to
a patient in need thereof a composition of claim 289 in
unit dosage form.

35 293. A method for the prophylaxis or treatment of
an atherosclerotic condition comprising administering
to a patient in need thereof a composition of claim 290

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in unit dosage form.

5 294. A method for the prophylaxis or treatment of hypercholesterolemia comprising administering to a patient in need thereof a composition of claim 291 in unit dosage form.

10 295. A pharmaceutical composition comprising an anti-hyperlipidemic condition effective amount of a compound of formula (I) of claim 249, and a pharmaceutically acceptable carrier.

15 296. A pharmaceutical composition comprising an anti-atherosclerotic effective amount of a compound of formula (I) of claim 249, and a pharmaceutically acceptable carrier.

20 297. A pharmaceutical composition comprising an anti-hypercholesterolemia effective amount of a compound of formula (I) of claim 249, and a pharmaceutically acceptable carrier.

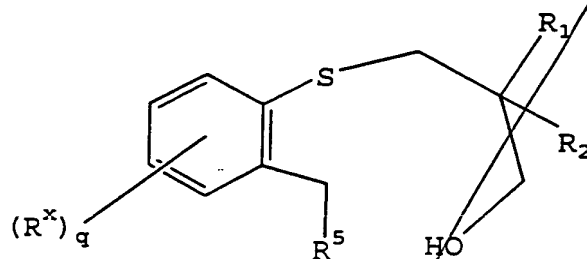
25 298. A method for the prophylaxis or treatment of a hyperlipidemic condition comprising administering to a patient in need thereof a composition of claim 295 in unit dosage form.

30 299. A method for the prophylaxis or treatment of an atherosclerotic condition comprising administering to a patient in need thereof a composition of claim 296 in unit dosage form.

35 300. A method for the prophylaxis or treatment of hypercholesterolemia comprising administering to a patient in need thereof a composition of claim 297 in

unit dosage form.

301. A process for the preparation of a compound having the formula:



XLI

comprising:

treating a thiophenol with an abstracting agent;
coupling the thiophenyl and a cyclic sulfate to
form an intermediate comprising a sulfate group; and
removing the sulfate group of the intermediate to
form the compound of formula XLI;

wherein

q is an integer from 1 to 4;

R¹ and R² are independently selected from the group
consisting of H, alkyl, alkenyl, alkynyl, haloalkyl,
alkylaryl, arylalkyl, alkoxy, alkoxyalkyl,
dialkylamino, alkylthio, (polyalkyl)aryl, and
cycloalkyl,

wherein alkyl, alkenyl, alkynyl, haloalkyl,
alkylaryl, arylalkyl, alkoxy, alkoxyalkyl,
dialkylamino, alkylthio, (polyalkyl)aryl, and
cycloalkyl optionally are substituted with one or more
substituents selected from the group consisting of OR⁹,
NR⁹R¹⁰, N⁺R⁹R¹⁰R¹¹A⁻, SR⁹, S⁺R⁹R¹⁰A⁻, P⁺R⁹R¹⁰R¹¹A⁻, S(O)R⁹, SO₂R⁹,
SO₃R⁹, CO₂R⁹, CN, halogen, oxo, and CONR⁹R¹⁰,

wherein alkyl, alkenyl, alkynyl, alkylaryl,
alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl
optionally have one or more carbons replaced by O, NR⁹,

$N^+R^9R^{10}A^-$, S, SO, SO₂, $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,
wherein R⁹, R¹⁰, and R^{*} are independently selected
from the group consisting of H, alkyl, alkenyl,
alkynyl, cycloalkyl, aryl, acyl, heterocycle,
5 ammoniumalkyl, arylalkyl, carboxyalkyl,
carboxyheteroaryl, carboxyheterocycle,
carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl,
heterocyclylalkyl, and alkylammoniumalkyl; or

R¹ and R² taken together with the carbon to which
10 they are attached form C₃-C₁₀ cycloalkyl;

R³ is hydroxy;

R⁴ is hydrogen;

R⁵ and R⁶ are independently selected from the
group consisting of H, alkyl, alkenyl, alkynyl, aryl,
15 cycloalkyl, heterocycle, quaternary heterocycle, OR³⁰,
SR⁹, S(O)R⁹, SO₂R⁹, and SO₃R⁹,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl,
heterocycle, quaternary heterocycle, and quaternary
heteroaryl can be substituted with one or more
20 substituent groups independently selected from the
group consisting of alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, heterocycle,
arylalkyl, quaternary heterocycle, quaternary
heteroaryl, halogen, oxo, OR¹³, NR¹³R¹⁴, SR¹³, S(O)R¹³,
25 SO₂R¹³, SO₃R¹³, NR¹³OR¹⁴, NR¹³NR¹⁴R¹⁵, NO₂, CO₂R¹³, CN,
OM, SO₂OM, SO₂NR¹³R¹⁴, C(O)NR¹³R¹⁴, C(O)OM, COR¹³,
NR¹³C(O)R¹⁴, NR¹³C(O)NR¹⁴R¹⁵, NR¹³CO₂R¹⁴, OC(O)R¹³,
OC(O)NR¹³R¹⁴, NR¹³SOR¹⁴, NR¹³SO₂R¹⁴, NR¹³SONR¹⁴R¹⁵,
NR¹³SO₂NR¹⁴R¹⁵, P(O)R¹³R¹⁴, P⁺R¹³R¹⁴R¹⁵A⁻, P(OR¹³)OR¹⁴,
30 S⁺R¹³R¹⁴A⁻, and N⁺R⁹R¹¹R¹²A⁻,

wherein:

A⁻ is a pharmaceutically acceptable anion and M is

a pharmaceutically acceptable cation,

said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent

5 groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo, $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8R^9A^-$, and $P(O)(OR^7)OR^8$, and

10 wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O, NR^7 , $N^+R^7R^8A^-$, S, SO, SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$, $P^+R^7R^8A^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, arylalkyl, alkylarylalkyl, alkylheteroarylalkyl, alkylheterocyclalkyl, 15 cycloalkyl, heterocycle, heteroaryl, quaternary heterocycle, quaternary heteroaryl, heterocyclalkyl, heteroarylalkyl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, alkylammoniumalkyl, and carboxyalkylaminocarbonylalkyl,

20 wherein alkyl, alkenyl, alkynyl, arylalkyl, heterocycle, and polyalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, $P(O)R^9$, phenylene, carbohydrate, amino acid, peptide, or polypeptide, and

30 R^{13} , R^{14} , and R^{15} are optionally substituted with one or more groups selected from the group consisting

of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl, heterocycle, heteroaryl, sulfoalkyl, quaternary heterocycle, quaternary heteroaryl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, 5 guanidiny, OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{10}R^{11}A^-$, $S^+R^9R^{10}A^-$, and $C(O)OM$,

wherein R^{16} and R^{17} are independently selected 10 from the substituents constituting R^9 and M; or R^{13} and R^{14} , together with the nitrogen atom to which they are attached form a mono- or polycyclic heterocycle that is optionally substituted with one or more radicals selected from the group consisting of 15 oxo, carboxy and quaternary salts; or

R^{14} and R^{15} , together with the nitrogen atom to which they are attached, form a cyclic ring; and

R^{30} is selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, 20 ammoniumalkyl, alkylammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclalkyl, and alkylammoniumalkyl; and

R^7 and R^8 are hydrogen; and

25 one or more R^* are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heteroaryl, polyether, quaternary heterocycle, quaternary heteroaryl, 30 OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$,

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$P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, and alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl, quaternary heterocycle, and quaternary heteroaryl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_3R^9 , SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

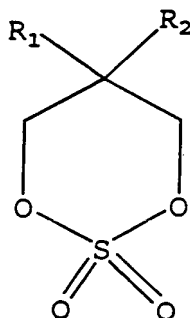
wherein in R^x , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl,

wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$;

wherein quaternary heterocycle and quaternary heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$,

$P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$.

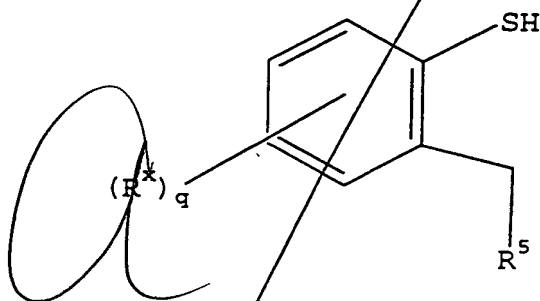
302. The process of claim 301 wherein the cyclic sulfate has the formula:



5

XL

and the thiophenol has the formula:



XVIII A

10

wherein R^1 , R^2 , R^5 , R^x and q are as defined in claim 301.

15

303. The process of claim 301 wherein the sulfate group is removed by treating the intermediate with a hydrolyzing agent.

304. The process of claim 303 wherein the hydrolyzing agent is a mineral acid.

305. The process of claim 303 wherein the

hydrolyzing agent is selected from the group consisting of hydrochloric acid and sulfuric acid.

5 306. The process of claim 302 wherein the abstracting agent is a base having a pH of at least about 10.

10 307. The process of claim 302 wherein the abstracting agent is an alkali metal hydride.

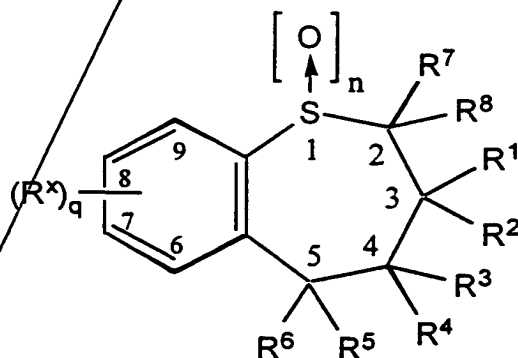
308. The process of claim 302 wherein the abstracting agent is sodium hydride.

15 309. The process of claim 302 wherein the R^1 and R^2 are alkyl.

20 310. The process of claim 302 wherein the R^1 and R^2 are selected from the group consisting of ethyl, n-butyl, iso-butyl and pentyl.

311. The process of claim 302 wherein the R^1 and R^2 are n-butyl.

25 312. A process for the preparation of a compound having the formula I:



(I)

comprising:

reacting a cyclic sulfate with a thiophenol to
form an alcohol;

oxidizing said alcohol to form a sulfone-aldehyde;
and

5 cyclizing said sulfone-aldehyde to form the
compound of formula I;

wherein:

q is an integer from 1 to 4;

n is 2;

10 R^1 and R^2 are independently selected from the group
consisting of H, alkyl, alkenyl, alkynyl, haloalkyl,
alkylaryl, arylalkyl, alkoxy, alkoxyalkyl,
dialkylamino, alkylthio, (polyalkyl)aryl, and
cycloalkyl,

15 wherein alkyl, alkenyl, alkynyl, haloalkyl,
alkylaryl, arylalkyl, alkoxy, alkoxyalkyl,
dialkylamino, alkylthio, (polyalkyl)aryl, and
cycloalkyl optionally are substituted with one or more
substituents selected from the group consisting of OR^9 ,
20 NR^9R^{10} , $N^+R^9R^{10}R^wA^-$, SR^9 , $S^+R^9R^{10}A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 ,
 SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

wherein alkyl, alkenyl, alkynyl, alkylaryl,
alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl
optionally have one or more carbons replaced by O, NR^9 ,
25 $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

wherein R^9 , R^{10} , and R^w are independently selected
from the group consisting of H, alkyl, alkenyl,
alkynyl, cycloalkyl, aryl, acyl, heterocycle,
ammoniumalkyl, arylalkyl, carboxyalkyl,
30 carboxyheteroaryl, carboxyheterocycle,
carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl,
heterocyclylalkyl, and alkylammoniumalkyl; or

R^1 and R^2 taken together with the carbon to which
they are attached form C_3 - C_{10} cycloalkyl;

35 R^3 is hydroxy;

R^4 is hydrogen;

R^5 and R^6 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, OR^{30} , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 ,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, and quaternary heteroaryl can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $NR^{13}C(O)R^{14}$, $NR^{13}C(O)NR^{14}R^{15}$, $NR^{13}CO_2R^{14}$, $OC(O)R^{13}$, $OC(O)NR^{13}R^{14}$, $NR^{13}SOR^{14}$, $NR^{13}SO_2R^{14}$, $NR^{13}SONR^{14}R^{15}$, $NR^{13}SO_2NR^{14}R^{15}$, $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

wherein:

A^- is a pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation,

said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN, oxo, $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, $P(O)R^7R^8$,

$P^+R^7R^8R^9A^-$, and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O,

5 NR^7 , $N^+R^7R^8A^-$, S, SO, SO₂, $S^+R^7A^-$, PR^7 , $P(O)R^7$,

$P^+R^7R^8A^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, polyalkyl,

polyether, aryl, arylalkyl, alkylarylalkyl, alkylheteroarylalkyl, alkylheterocyclalkyl, cycloalkyl, heterocycle, heteroaryl, quaternary heterocycle, quaternary heteroaryl, heterocyclalkyl, heteroarylalkyl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, alkylammoniumalkyl, and carboxyalkylaminocarbonylalkyl,

15 wherein alkyl, alkenyl, alkynyl, arylalkyl, heterocycle, and polyalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO₂, $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, $P(O)R^9$, phenylene, carbohydrate, amino acid, peptide, or polypeptide, and

20 R^{13} , R^{14} , and R^{15} are optionally substituted with one or more groups selected from the group consisting of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl, heterocycle, heteroaryl, sulfoalkyl, quaternary heterocycle, quaternary heteroaryl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, guanidiny, OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{10}R^{11}A^-$, $S^+R^9R^{10}A^-$, and

30 $C(O)OM$,

wherein R^{16} and R^{17} are independently selected

from the substituents constituting R^9 and M; or
 R^{13} and R^{14} , together with the nitrogen atom to
 which they are attached form a mono- or polycyclic
 heterocycle that is optionally substituted with one or
 5 more radicals selected from the group consisting of
 oxo, carboxy and quaternary salts; or

R^{14} and R^{15} , together with the nitrogen atom to
 which they are attached, form a cyclic ring; and

R^{30} is selected from the group consisting of alkyl,
 10 alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle,
 ammoniumalkyl, alkylammoniumalkyl, arylalkyl,
 carboxyalkyl, carboxyheteroaryl, carboxyheterocycle,
 carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl,
 heterocyclylalkyl, and alkylammoniumalkyl; and

15 R^7 and R^8 are hydrogen; and
 one or more R^* are independently selected from the
 group consisting of H, alkyl, alkenyl, alkynyl,
 polyalkyl, acyloxy, aryl, arylalkyl, halogen,
 haloalkyl, cycloalkyl, heterocycle, heteroaryl,
 20 polyether, quaternary heterocycle, quaternary
 heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} ,
 $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM ,
 $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$,
 COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$,
 25 $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and
 carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl,
 polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl,
 polyether, quaternary heterocycle, and quaternary
 30 heteroaryl can be further substituted with OR^9 , NR^9R^{10} ,
 $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN ,
 halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$,
 $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting

of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle,
heteroaryl, and alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl,
heterocycle, heteroaryl, alkyl, quaternary heterocycle,
5 and quaternary heteroaryl optionally are substituted
with one or more substituents selected from the group
consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 ,
 SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2R^9 , SO_2OM ,
 $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

10 wherein in R^x , one or more carbons are optionally
replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} ,
 $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide,
polypeptide, carbohydrate, polyether, or polyalkyl,

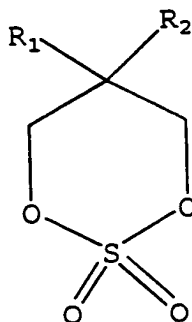
wherein in said polyalkyl, phenylene, amino acid,
15 peptide, polypeptide, and carbohydrate, one or more
carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S,
SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$;

wherein quaternary heterocycle and quaternary
heteroaryl are optionally substituted with one or more
20 groups selected from the group consisting of alkyl,
alkenyl, alkynyl, polyalkyl, polyether, aryl,
haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen,
oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$,
 $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$,
25 $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$,
 $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$.

313. The process of claim 312 wherein the cyclic
sulfate has the formula:

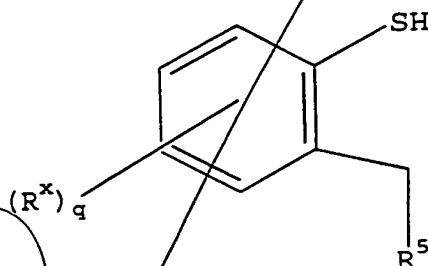
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and the thiophenol has the formula:



XVIII A

wherein R^1 , R^2 , R^5 , R^x and q are as defined in claim 312.

314. The process of claim 313 wherein the R^1 and R^2 are alkyl.

315. The process of claim 313 wherein the R^1 and R^2 are selected from the group consisting of ethyl, n-butyl, iso-butyl and pentyl.

316. The process of claim 313 wherein the R^1 and R^2 are n-butyl.

317. The process of claim 313 wherein the alcohol is oxidized with an oxidizing agent to form an

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aldehyde.

318. The process of claim 317 wherein the aldehyde is oxidized with an oxidizing agent to form a sulfone-aldehyde.

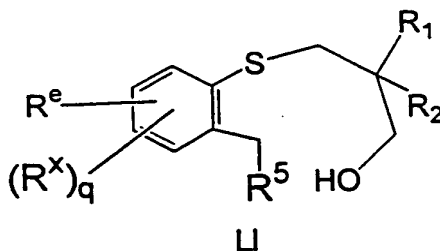
319. The process of claim 313 wherein the sulfone-aldehyde is cyclized with a cyclizing agent that is a base having a pH between about 8 to about 9.

320. The process of claim 313 wherein the sulfone-aldehyde is cyclized with a cyclizing agent that is an alkali alkoxide base.

321. The process of claim 313 wherein the sulfone-aldehyde is cyclized with potassium tert-butoxide.

322. The process of claim 313 wherein the alcohol is oxidized with pyridinium chlorochromate to form an aldehyde; the aldehyde is oxidized with metachloroperbenzoic acid to form a sulfone-aldehyde; and the sulfone-aldehyde is cyclized with potassium tert-butoxide.

323. A process for the preparation of a compound having the formula LI:



comprising:

treating a halobenzene with an abstracting agent;

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coupling the halobenzene and a cyclic sulfate to
form an intermediate comprising a sulfate group; and
removing the sulfate group of the intermediate to
form the compound of formula LI; wherein

5 q is an integer from 1 to 4;

R¹ and R² are independently selected from the group
consisting of H, alkyl, alkenyl, alkynyl, haloalkyl,
alkylaryl, arylalkyl, alkoxy, alkoxyalkyl,
dialkylamino, alkylthio, (polyalkyl)aryl, and
10 cycloalkyl,

wherein alkyl, alkenyl, alkynyl, haloalkyl,
alkylaryl, arylalkyl, alkoxy, alkoxyalkyl,
dialkylamino, alkylthio, (polyalkyl)aryl, and
cycloalkyl optionally are substituted with one or more
15 substituents selected from the group consisting of OR⁹,
NR⁹R¹⁰, N⁺R⁹R¹⁰R^wA⁻, SR⁹, S⁻R⁹R¹⁰A⁻, P⁺R⁹R¹⁰R¹¹A⁻, S(O)R⁹, SO₂R⁹,
SO₃R⁹, CO₂R⁹, CN, halogen, oxo, and CONR⁹R¹⁰,

wherein alkyl, alkenyl, alkynyl, alkylaryl,
alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl
20 optionally have one or more carbons replaced by O, NR⁹,
N⁺R⁹R¹⁰A⁻, S, SO, SO₂, S⁻R⁹A⁻, P⁺R⁹R¹⁰A⁻, or phenylene,
wherein R⁹, R¹⁰, and R^w are independently selected

from the group consisting of H, alkyl, alkenyl,
alkynyl, cycloalkyl, aryl, acyl, heterocycle,
25 ammoniumalkyl, arylalkyl, carboxyalkyl,
carboxyheteroaryl, carboxyheterocycle,
carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl,
heterocyclylalkyl, and alkylammoniumalkyl; or

R¹ and R² taken together with the carbon to which
30 they are attached form C₃-C₁₀ cycloalkyl;

R³ is hydroxy;

R⁴ is hydrogen;

R⁵ and R⁶ are independently selected from the
group consisting of H, alkyl, alkenyl, alkynyl, aryl,

cycloalkyl, heterocycle, quaternary heterocycle, OR^{30} ,
 SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 ,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl,
heterocycle, quaternary heterocycle, and quaternary
heteroaryl can be substituted with one or more
substituent groups independently selected from the
group consisting of alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, heterocycle,
arylalkyl, quaternary heterocycle, quaternary
heteroaryl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$,
 SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN ,
 OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} ,
 $NR^{13}C(O)R^{14}$, $NR^{13}C(O)NR^{14}R^{15}$, $NR^{13}CO_2R^{14}$, $OC(O)R^{13}$,
 $OC(O)NR^{13}R^{14}$, $NR^{13}SOR^{14}$, $NR^{13}SO_2R^{14}$, $NR^{13}SONR^{14}R^{15}$,
 $NR^{13}SO_2NR^{14}R^{15}$, $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$,
 $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

wherein:

A^- is a pharmaceutically acceptable anion and M is
a pharmaceutically acceptable cation,

said alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, and heterocycle
can be further substituted with one or more substituent
groups selected from the group consisting of OR^7 ,
 NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo,
 $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl,
cycloalkyl, heterocycle, arylalkyl, quaternary
heterocycle, quaternary heteroaryl, $P(O)R^7R^8$,
 $P^+R^7R^8R^9A^-$, and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, haloalkyl, cycloalkyl, and heterocycle

can optionally have one or more carbons replaced by O,
NR⁷, N⁺R⁷R⁸A⁻, S, SO, SO₂, S⁺R⁷A⁻, PR⁷, P(O)R⁷,
P⁺R⁷R⁸A⁻, or phenylene, and R¹³, R¹⁴, and R¹⁵ are
independently selected from the group consisting of
5 hydrogen, alkyl, alkenyl, alkynyl, polyalkyl,
polyether, aryl, arylalkyl, alkylarylalkyl,
alkylheteroarylalkyl, alkylheterocyclalkyl,
cycloalkyl, heterocycle, heteroaryl, quaternary
heterocycle, quaternary heteroaryl, heterocyclalkyl,
10 heteroarylalkyl, quaternary heterocyclalkyl,
quaternary heteroarylalkyl, alkylammoniumalkyl, and
carboxyalkylaminocarbonylalkyl,

wherein alkyl, alkenyl, alkynyl, arylalkyl,
heterocycle, and polyalkyl optionally have one or more
15 carbons replaced by O, NR⁹, N⁺R⁹R¹⁰A⁻, S, SO, SO₂,
S⁺R⁹A⁻, PR⁹, P⁺R⁹R¹⁰A⁻, P(O)R⁹, phenylene, carbohydrate,
amino acid, peptide, or polypeptide, and

R¹³, R¹⁴, and R¹⁵ are optionally substituted with
one or more groups selected from the group consisting
20 of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl,
heterocycle, heteroaryl, sulfoalkyl, quaternary
heterocycle, quaternary heteroaryl, quaternary
heterocyclalkyl, quaternary heteroarylalkyl,
guanidiny, OR⁹, NR⁹R¹⁰, N⁺R⁹R¹¹R¹²A⁻, SR⁹, S(O)R⁹,
25 SO₂R⁹, SO₃R⁹, oxo, CO₂R⁹, CN, halogen, CONR⁹R¹⁰, SO₂OM,
SO₂NR⁹R¹⁰, PO(OR¹⁶)OR¹⁷, P⁺R⁹R¹⁰R¹¹A⁻, S⁺R⁹R¹⁰A⁻, and
C(O)OM,

wherein R¹⁶ and R¹⁷ are independently selected
from the substituents constituting R⁹ and M; or
30 R¹³ and R¹⁴, together with the nitrogen atom to
which they are attached form a mono- or polycyclic

heterocycle that is optionally substituted with one or more radicals selected from the group consisting of oxo, carboxy and quaternary salts; or

5 R^{14} and R^{15} , together with the nitrogen atom to which they are attached, form a cyclic ring; and

R^{30} is selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, alkylammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclylalkyl, and alkylammoniumalkyl; and

R^7 and R^8 are hydrogen; and

one or more R^x are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heteroaryl, polyether, quaternary heterocycle, quaternary heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

25 wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

30 wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, and alkyl,

35 wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl, quaternary heterocycle,

and quaternary heteroaryl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_3R^9 , SO_2OM ,
5 $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, and $C(O)OM$,

wherein in R^x , one or more carbons are optionally replaced by O, NR^{13} , $N^+R^{13}R^{14}A^-$, S, SO, SO_2 , $S^+R^{13}A^-$, PR^{13} , $P(O)R^{13}$, $P^+R^{13}R^{14}A^-$, phenylene, amino acid, peptide, polypeptide, carbohydrate, polyether, or polyalkyl,

10 wherein in said polyalkyl, phenylene, amino acid, peptide, polypeptide, and carbohydrate, one or more carbons are optionally replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, or $P(O)R^9$;

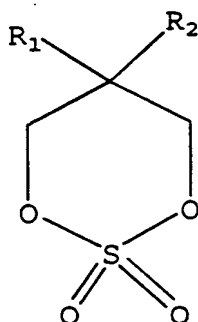
wherein quaternary heterocycle and quaternary
15 heteroaryl are optionally substituted with one or more groups selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$,
20 $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$; and

R^e is an electron-withdrawing group located at the para or ortho position.

25 324. The process of claim 323 wherein the cyclic sulfate has the formula:

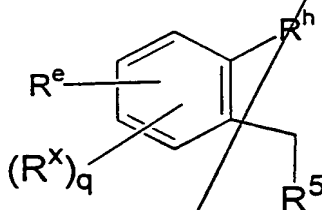
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and the halobenzene has the formula:



wherein R^h is halogen, and R^1 , R^2 , R^5 , R^x , R^e and q are as defined in claim 323.

325. The process of claim 324 wherein the sulfate group is removed by treating the intermediate with a hydrolyzing agent.

326. The process of claim 325 wherein the hydrolyzing agent is a mineral acid.

327. The process of claim 325 wherein the hydrolyzing agent is selected from the group consisting of hydrochloric acid and sulfuric acid.

328. The process of claim 324 wherein the abstracting agent is a dialkali metal sulfide.

329. The process of claim 324 wherein the abstracting agent is dilithium sulfide.

330. The process of claim 324 wherein R^1 and R^2 are alkyl.

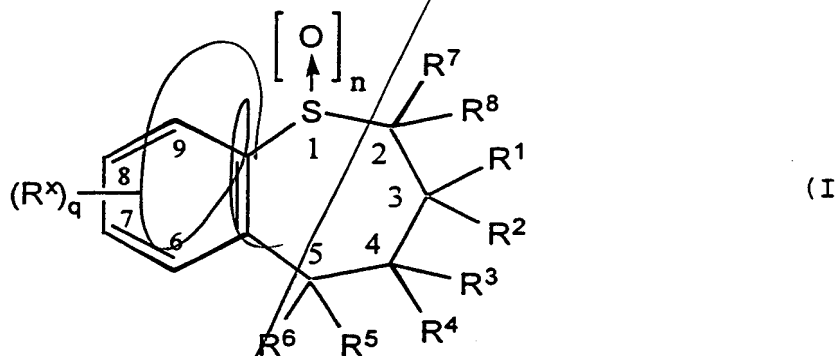
5 331. The process of claim 324 wherein R^1 and R^2 are selected from the group consisting of ethyl, n-butyl, iso-butyl and pentyl.

10 332. The process of claim 324 wherein R^1 and R^2 are n-butyl.

333. The process of claim 324 wherein R^h is chloro.

15 334. The process of claim 324 wherein R^e is p-nitro.

335. A process for the preparation of a compound having the formula I:



20 comprising:
reacting a cyclic sulfate with a halobenzene to
form an alcohol;
oxidizing said alcohol to form a sulfone-aldehyde;
25 and
cyclizing said sulfone-aldehyde to form the
compound of formula I;

wherein

q is an integer from 1 to 4;

n is 2;

5 R^1 and R^2 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl,

10 wherein alkyl, alkenyl, alkynyl, haloalkyl, alkylaryl, arylalkyl, alkoxy, alkoxyalkyl, dialkylamino, alkylthio, (polyalkyl)aryl, and cycloalkyl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{10}R^wA^-$, SR^9 , $S^+R^9R^{10}A^-$, $P^+R^9R^{10}R^{11}A^-$, $S(O)R^9$, SO_2R^9 , SO_3R^9 , CO_2R^9 , CN, halogen, oxo, and $CONR^9R^{10}$,

15 wherein alkyl, alkenyl, alkynyl, alkylaryl, alkoxy, alkoxyalkyl, (polyalkyl)aryl, and cycloalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO_2 , $S^+R^9A^-$, $P^+R^9R^{10}A^-$, or phenylene,

20 wherein R^9 , R^{10} , and R^w are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclylalkyl, and alkylammoniumalkyl; or

25 R^1 and R^2 taken together with the carbon to which they are attached form C_3 - C_{10} cycloalkyl;

R^3 is hydroxy;

30 R^4 is hydrogen;

R^5 and R^6 are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, OR^{30} , SR^9 , $S(O)R^9$, SO_2R^9 , and SO_3R^9 ,

wherein alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, quaternary heterocycle, and quaternary heteroaryl can be substituted with one or more substituent groups independently selected from the group consisting of alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, halogen, oxo, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, SO_2R^{13} , SO_3R^{13} , $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $C(O)NR^{13}R^{14}$, $C(O)OM$, COR^{13} , $NR^{13}C(O)R^{14}$, $NR^{13}C(O)NR^{14}R^{15}$, $NR^{13}CO_2R^{14}$, $OC(O)R^{13}$, $OC(O)NR^{13}R^{14}$, $NR^{13}SOR^{14}$, $NR^{13}SO_2R^{14}$, $NR^{13}SONR^{14}R^{15}$, $NR^{13}SO_2NR^{14}R^{15}$, $P(O)R^{13}R^{14}$, $P^+R^{13}R^{14}R^{15}A^-$, $P(OR^{13})OR^{14}$, $S^+R^{13}R^{14}A^-$, and $N^+R^9R^{11}R^{12}A^-$,

wherein:

A^- is a pharmaceutically acceptable anion and M is a pharmaceutically acceptable cation,

said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can be further substituted with one or more substituent groups selected from the group consisting of OR^7 , NR^7R^8 , SR^7 , $S(O)R^7$, SO_2R^7 , SO_3R^7 , CO_2R^7 , CN , oxo, $CONR^7R^8$, $N^+R^7R^8R^9A^-$, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocycle, arylalkyl, quaternary heterocycle, quaternary heteroaryl, $P(O)R^7R^8$, $P^+R^7R^8R^9A^-$, and $P(O)(OR^7)OR^8$, and

wherein said alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, haloalkyl, cycloalkyl, and heterocycle can optionally have one or more carbons replaced by O, NR^7 , $N^+R^7R^8A^-$, S , SO , SO_2 , $S^+R^7A^-$, PR^7 , $P(O)R^7$,

$P^+R^7R^8A^-$, or phenylene, and R^{13} , R^{14} , and R^{15} are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, polyalkyl, polyether, aryl, arylalkyl, alkylarylalkyl, alkylheteroarylalkyl, alkylheterocyclalkyl, cycloalkyl, heterocycle, heteroaryl, quaternary heterocycle, quaternary heteroaryl, heterocyclalkyl, heteroarylalkyl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, alkylammoniumalkyl, and carboxyalkylaminocarbonylalkyl,

wherein alkyl, alkenyl, alkynyl, arylalkyl, heterocycle, and polyalkyl optionally have one or more carbons replaced by O, NR^9 , $N^+R^9R^{10}A^-$, S, SO, SO₂, $S^+R^9A^-$, PR^9 , $P^+R^9R^{10}A^-$, $P(O)R^9$, phenylene, carbohydrate, amino acid, peptide, or polypeptide, and

R^{13} , R^{14} , and R^{15} are optionally substituted with one or more groups selected from the group consisting of hydroxy, amino, sulfo, carboxy, alkyl, carboxyalkyl, heterocycle, heteroaryl, sulfoalkyl, quaternary heterocycle, quaternary heteroaryl, quaternary heterocyclalkyl, quaternary heteroarylalkyl, guanidinyl, OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{10}R^{11}A^-$, $S^+R^9R^{10}A^-$, and $C(O)OM$,

wherein R^{16} and R^{17} are independently selected from the substituents constituting R^9 and M; or R^{13} and R^{14} , together with the nitrogen atom to which they are attached form a mono- or polycyclic heterocycle that is optionally substituted with one or more radicals selected from the group consisting of oxo, carboxy and quaternary salts; or

R^{14} and R^{15} , together with the nitrogen atom to which they are attached, form a cyclic ring; and

R^{30} is selected from the group consisting of alkyl, alkenyl, alkynyl, cycloalkyl, aryl, acyl, heterocycle, ammoniumalkyl, alkylammoniumalkyl, arylalkyl, carboxyalkyl, carboxyheteroaryl, carboxyheterocycle, carboalkoxyalkyl, carboxyalkylamino, heteroarylalkyl, heterocyclylalkyl, and alkylammoniumalkyl; and

R^7 and R^8 are hydrogen; and

one or more R^x are independently selected from the group consisting of H, alkyl, alkenyl, alkynyl, polyalkyl, acyloxy, aryl, arylalkyl, halogen, haloalkyl, cycloalkyl, heterocycle, heteroaryl, polyether, quaternary heterocycle, quaternary heteroaryl, OR^{13} , $NR^{13}R^{14}$, SR^{13} , $S(O)R^{13}$, $S(O)_2R^{13}$, SO_3R^{13} , $S^+R^{13}R^{14}A^-$, $NR^{13}OR^{14}$, $NR^{13}NR^{14}R^{15}$, NO_2 , CO_2R^{13} , CN , OM , SO_2OM , $SO_2NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)NR^{13}R^{14}$, $NR^{14}C(O)R^{13}$, $C(O)OM$, COR^{13} , OR^{18} , $S(O)_nNR^{18}$, $NR^{13}R^{18}$, $NR^{18}OR^{14}$, $N^+R^9R^{11}R^{12}A^-$, $P^+R^9R^{11}R^{12}A^-$, amino acid, peptide, polypeptide, and carbohydrate,

wherein alkyl, alkenyl, alkynyl, cycloalkyl, aryl, polyalkyl, heterocycle, acyloxy, arylalkyl, haloalkyl, polyether, quaternary heterocycle, and quaternary heteroaryl can be further substituted with OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 , SO_3R^9 , oxo, CO_2R^9 , CN , halogen, $CONR^9R^{10}$, SO_2OM , $SO_2NR^9R^{10}$, $PO(OR^{16})OR^{17}$, $P^+R^9R^{11}R^{12}A^-$, $S^+R^9R^{10}A^-$, or $C(O)OM$, and

wherein R^{18} is selected from the group consisting of acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, and alkyl,

wherein acyl, arylalkoxycarbonyl, arylalkyl, heterocycle, heteroaryl, alkyl, quaternary heterocycle, and quaternary heteroaryl optionally are substituted with one or more substituents selected from the group consisting of OR^9 , NR^9R^{10} , $N^+R^9R^{11}R^{12}A^-$, SR^9 , $S(O)R^9$, SO_2R^9 ,

SO_3R^9 , oxo, CO_2R^9 , CN, halogen, $\text{CONR}^9\text{R}^{10}$, SO_3R^9 , SO_2OM ,
 $\text{SO}_2\text{NR}^9\text{R}^{10}$, $\text{PO}(\text{OR}^{16})\text{OR}^{17}$, and $\text{C}(\text{O})\text{OM}$,

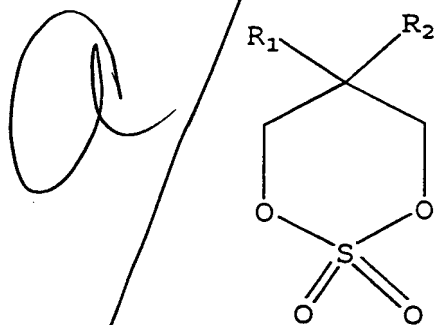
wherein in R^x , one or more carbons are optionally
 replaced by O, NR^{13} , $\text{N}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, S, SO, SO_2 , $\text{S}^+\text{R}^{13}\text{A}^-$, PR^{13} ,
 5 $\text{P}(\text{O})\text{R}^{13}$, $\text{P}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, phenylene, amino acid, peptide,
 polypeptide, carbohydrate, polyether, or polyalkyl,

wherein in said polyalkyl, phenylene, amino acid,
 peptide, polypeptide, and carbohydrate, one or more
 carbons are optionally replaced by O, NR^9 , $\text{N}^+\text{R}^9\text{R}^{10}\text{A}^-$, S,
 10 SO , SO_2 , $\text{S}^+\text{R}^9\text{A}^-$, PR^9 , $\text{P}^+\text{R}^9\text{R}^{10}\text{A}^-$, or $\text{P}(\text{O})\text{R}^9$;

wherein quaternary heterocycle and quaternary
 heteroaryl are optionally substituted with one or more
 groups selected from the group consisting of alkyl,
 alkenyl, alkynyl, polyalkyl, polyether, aryl,
 15 haloalkyl, cycloalkyl, heterocycle, arylalkyl, halogen,
 oxo, OR^{13} , $\text{NR}^{13}\text{R}^{14}$, SR^{13} , $\text{S}(\text{O})\text{R}^{13}$, SO_2R^{13} , SO_3R^{13} , $\text{NR}^{13}\text{OR}^{14}$,
 $\text{NR}^{13}\text{NR}^{14}\text{R}^{15}$, NO_2 , CO_2R^{13} , CN, OM, SO_2OM , $\text{SO}_2\text{NR}^{13}\text{R}^{14}$,
 $\text{C}(\text{O})\text{NR}^{13}\text{R}^{14}$, $\text{C}(\text{O})\text{OM}$, COR^{13} , $\text{P}(\text{O})\text{R}^{13}\text{R}^{14}$, $\text{P}^+\text{R}^{13}\text{R}^{14}\text{R}^{15}\text{A}^-$,
 $\text{P}(\text{OR}^{13})\text{OR}^{14}$, $\text{S}^+\text{R}^{13}\text{R}^{14}\text{A}^-$, and $\text{N}^+\text{R}^9\text{R}^{11}\text{R}^{12}\text{A}^-$; and

20 R^e is an electron-withdrawing group located at the
 para or ortho position.

336. The process of claim 335 wherein the cyclic
 sulfate has the formula:

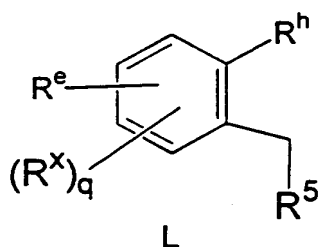


XL

and the halobenzene has the formula:

SRL 6071
(C-3021/2)

664



wherein R^1 , R^2 , R^5 , R^x and R^e are as defined in claim 335, and R^h is halogen.

5 337. The process of claim 336 wherein the sulfate group is removed by treating the intermediate with a hydrolyzing agent.

10 338. The process of claim 337 wherein the hydrolyzing agent is a mineral acid.

15 339. The process of claim 336 wherein the hydrolyzing agent is selected from the group consisting of hydrochloric acid and sulfuric acid.

 340. The process of claim 336 wherein the abstracting agent is a dialkali metal sulfide.

20 341. The process of claim 336 wherein the abstracting agent is dilithium sulfide.

 342. The process of claim 336 wherein R^1 and R^2 are alkyl.

25 343. The process of claim 336 wherein R^1 and R^2 are selected from the group consisting of ethyl, n-butyl, iso-butyl and pentyl.

30 344. The process of claim 336 wherein R^1 and R^2 are n-butyl.

345. The process of claim 336 wherein R^h is chloro.

5 346. The process of claim 336 wherein R^e is p-nitro.

10 347. The process of claim 336 wherein the alcohol is oxidized with an oxidizing agent to form a sulfone.

15 348. The process of claim 336 wherein the sulfone is oxidized with an oxidizing agent to form a sulfone-aldehyde.

20 349. The process of claim 336 wherein the sulfone-aldehyde is cyclized with a cyclizing agent that is a base having a pH between about 8 to about 9.

25 350. The process of claim 336 wherein the sulfone-aldehyde is cyclized with a cyclizing agent that is an alkali alkoxide base.

30 351. The process of claim 336 wherein the sulfone-aldehyde is cyclized with potassium tert-butoxide.

35 352. The process of claim 336 wherein the alcohol is oxidized with metachloroperbenzoic acid to form a sulfone; the aldehyde is oxidized with pyridinium chlorochromate to form a sulfone-aldehyde; and the sulfone-aldehyde is cyclized with potassium tert-butoxide.